Prüfbericht - Produkte
Test Report - Products

TÜVRheinland®

HPrüfbericht-Nr.: *Test report no.*:	**CN25EQ5Z 001**	**Auftrags-Nr.:** *Order no.*:	326060242	Seite 1 von 31 *Page 1 of 31*
Kunden-Referenz-Nr.: *Client reference no.*:	2513995	**Auftragsdatum:** *Order date:*	2024-10-29	
Auftraggeber: *Client*:	**Suzhou RCT Power Energy Technology Co., Ltd.** Unit 01, 02, Building B, No.28 5.1.2e 5.1.2e, Suzhou, Jiangsu P.R. China			
Prüfgegenstand: *Test item*:	C&I Energy Storage System			
Bezeichnung / Typ-Nr.: *Identification / Type no.*:	CESS932-500-01D, CESS699-375-01D, CESS466-250-01D			
Auftrags-Inhalt: *Order content*:	A3 Certificate			
Prüfgrundlage: *Test specification*:	EN 50549-2: 2019+A1 EN 50549-10: 2022			
Wareneingangsdatum: *Date of sample receipt*:	2024-11-15			
Prüfmuster-Nr.: *Test sample no:*	A003869340-001			
Prüfzeitraum: *Testing period*:	2024-11-15 - 2025-03-17			
Ort der Prüfung: *Place of testing*:	**Suzhou RCT Power Energy Technology Co., Ltd.** 5.1.2e 5.1.2e 5.1.2e 5.1.2e 5.1.2e China			
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüfergebnis*: *Test result**:	Pass			



geprüft von:
tested by: 5.1.2e

5.1.2e

Datum:
Date: 2025-03-20

genehmigt von:
authorized by: 5.1.2e

5.1.2e

Ausstellungsdatum:
Issue date: 2025-03-20

Stellung / Position: Project Engineer

Stellung / Position: Authorizer

Sonstiges / *Other*:

This report does not evidence compliance of the provided sample with the relevant standards but only with the referred tests. This test report documents the findings of examination conducted on the delivered product mentioned above only. This report does not entitle the applicant to carry any safety mark on this or similar products. Further for sales or other application purposes of the tested product, any reference to TÜV Rheinland or a test through TÜV Rheinland is only permissible with prior written consent of TÜV Rheinland.

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*

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.
This test report only relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.

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.*

Test Report issued under the responsibility of:

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TÜVRheinland®

TEST REPORT
EN 50549-2: 2019+A1

Requirements for generating plants to be connected in parallel with distribution networks - Part 2: Connection to a MV distribution network - Generating plants up to and including Type B

EN 50549-10:2022

Requirements for generating plants to be connected in parallel with distribution networks - Part 10: Tests for conformity assessment of generating units

Report Reference No..... :	**CN25EQ5Z 001**
Tested by (name + signature)..... :	See cover page .....
Witnessed by (name + signature).. :	See coverpage .....
Supervised by (name + signature). :	See coverpage .....
Approved by (name + signature)... :	See cover page .....
Date of issue..... :	See cover page
Testing Laboratory..... :	TÜV Rheinland (Shanghai) Co., Ltd.
Address..... :	5.1.2e 5.1.2e 5.1.2e, 5.1.2e 5.1.2e China
Testing location/ procedure ..... :	CBTL☐ TMP☐ WMT☐ SMT☐ RMT☐ CCATL ☐
Testing location/ address ..... :	No. 177, 178, Lane 777, 5.1.2e, Jing'an District, Shanghai, China
Applicant's name ..... :	See cover page
Address..... :	See cover page
Test specification:	
Standard ..... :	EN 50549-2: 2019+A1 EN 50549-10:2022
Test procedure..... :	A3 certificate
Non-standard test method..... :	N/A
Test Report Form No..... :	EN 50549-2: 2019+A1 EN 50549-10:2022
Test Report Form(s) Originator ..... :	TÜV Rheinland Group

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Test item description ..... :	C&I Energy storage system
Trade Mark..... :	RCT power
License Holder ..... :	Same as applicant.
Model/Type reference..... :	See cover page
Ratings..... :	See model list and marking label on following pages.

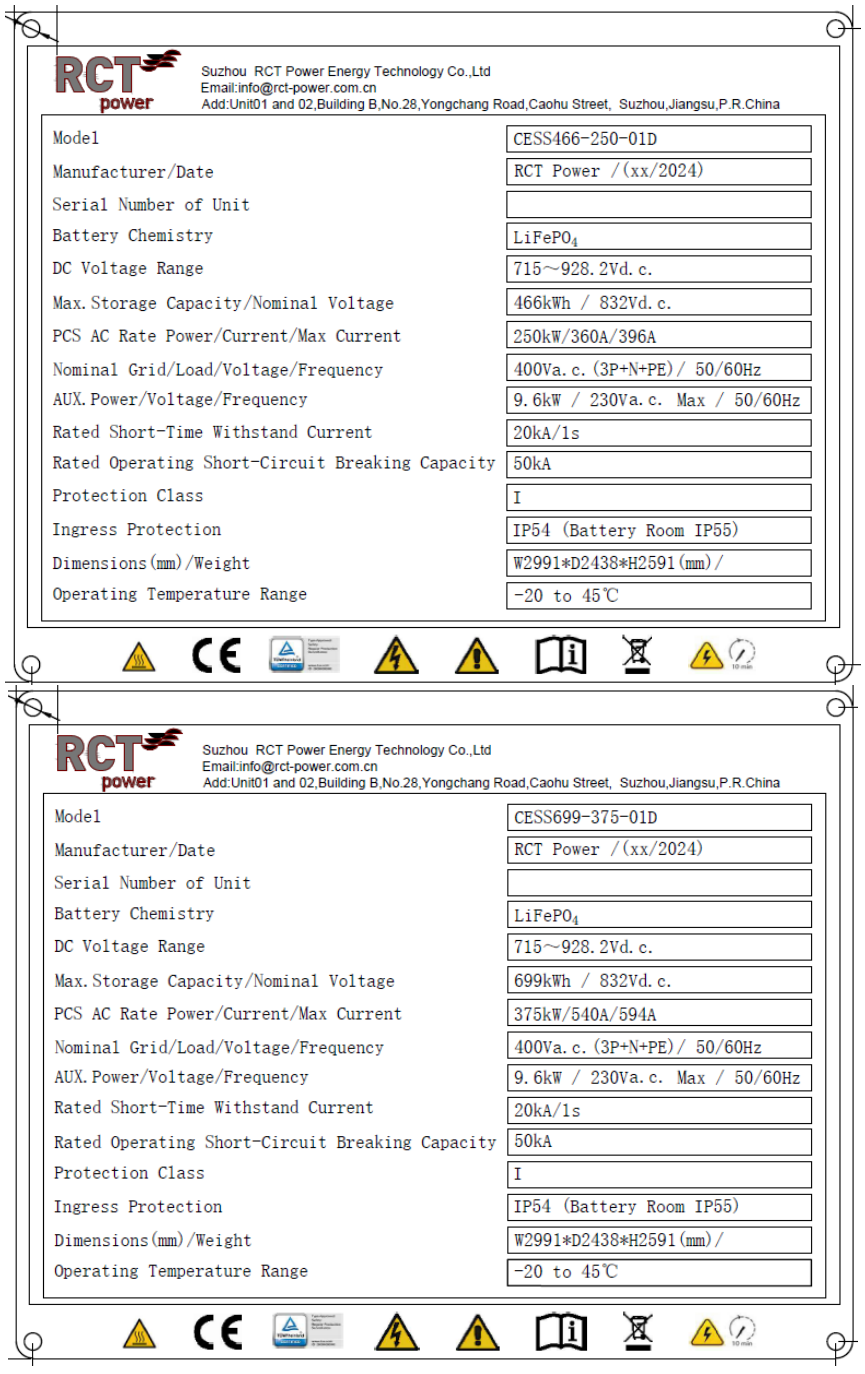
Testing procedure and testing location:	
☐ **CB Testing Laboratory:**	See cover page
Testing location/ address.....:	See cover page
☐ **Associated CB Test Laboratory:**	
Testing location/ address.....:	
Tested by (name + signature) ....:	See cover page
Approved by (+ signature).....:	See cover page
☐ Testing procedure: TMP	
Tested by (name + signature) ....:	
Approved by (+ signature).....:	
Testing location/ address.....:	
☐ Testing procedure: WMT	
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Witnessed by (+ signature).....:	
Approved by (+ signature).....:	
Testing location/ address.....:	
☐ Testing procedure: SMT	
Tested by (name + signature) ....:	
Approved by (+ signature).....:	
Supervised by (+ signature).....:	
Testing location/ address.....:	
☐ Testing procedure: RMT	
Tested by (name + signature) ....:	
Approved by (+ signature).....:	
Supervised by (+ signature).....:	
Testing location/ address.....:	

List of Attachments (including a total number of pages in each attachment):

Attachment 1 - Test Plan 617 pages

Attachment 2 - Photo Documentation 9 pages

Copy of marking plate:



RCT power

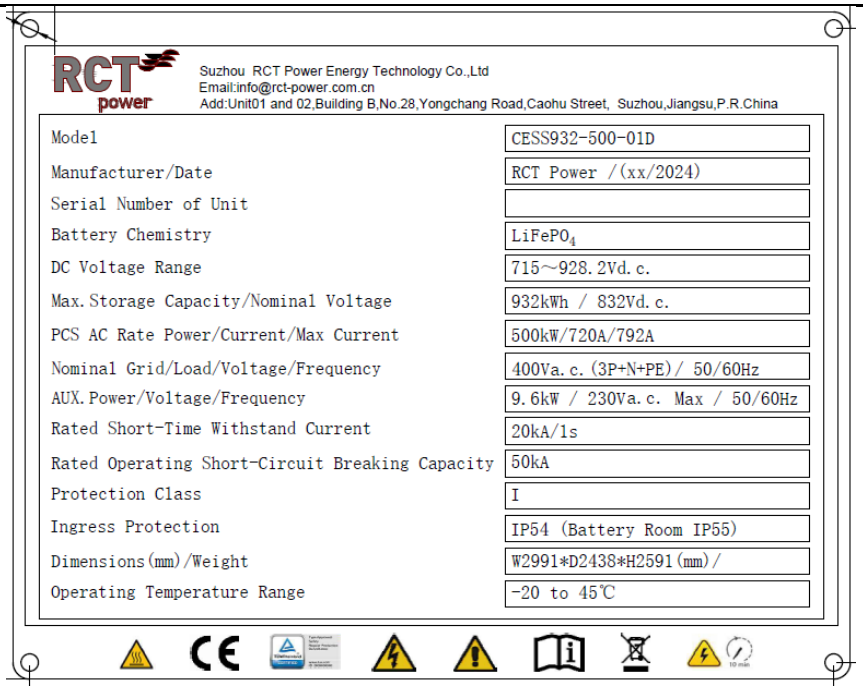
Suzhou RCT Power Energy Technology Co.,Ltd
Email:info@rct-power.com.cn
Add:Unit01 and 02,Building B,No.28,Yongchang Road,Caohu Street, Suzhou,Jiangsu,P.R.China

Model	CESS466-250-01D
Manufacturer/Date	RCT Power /(xx/2024)
Serial Number of Unit	
Battery Chemistry	$LiFePO_4$
DC Voltage Range	715~928.2Vd.c.
Max.Storage Capacity/Nominal Voltage	466kWh / 832Vd.c.
PCS AC Rate Power/Current/Max Current	250kW/360A/396A
Nominal Grid/Load/Voltage/Frequency	400Va.c.(3P+N+PE)/ 50/60Hz
AUX.Power/Voltage/Frequency	9.6kW / 230Va.c. Max / 50/60Hz
Rated Short-Time Withstand Current	20kA/1s
Rated Operating Short-Circuit Breaking Capacity	50kA
Protection Class	I
Ingress Protection	IP54 (Battery Room IP55)
Dimensions(mm)/Weight	W2991*D2438*H2591(mm)/
Operating Temperature Range	-20 to 45℃

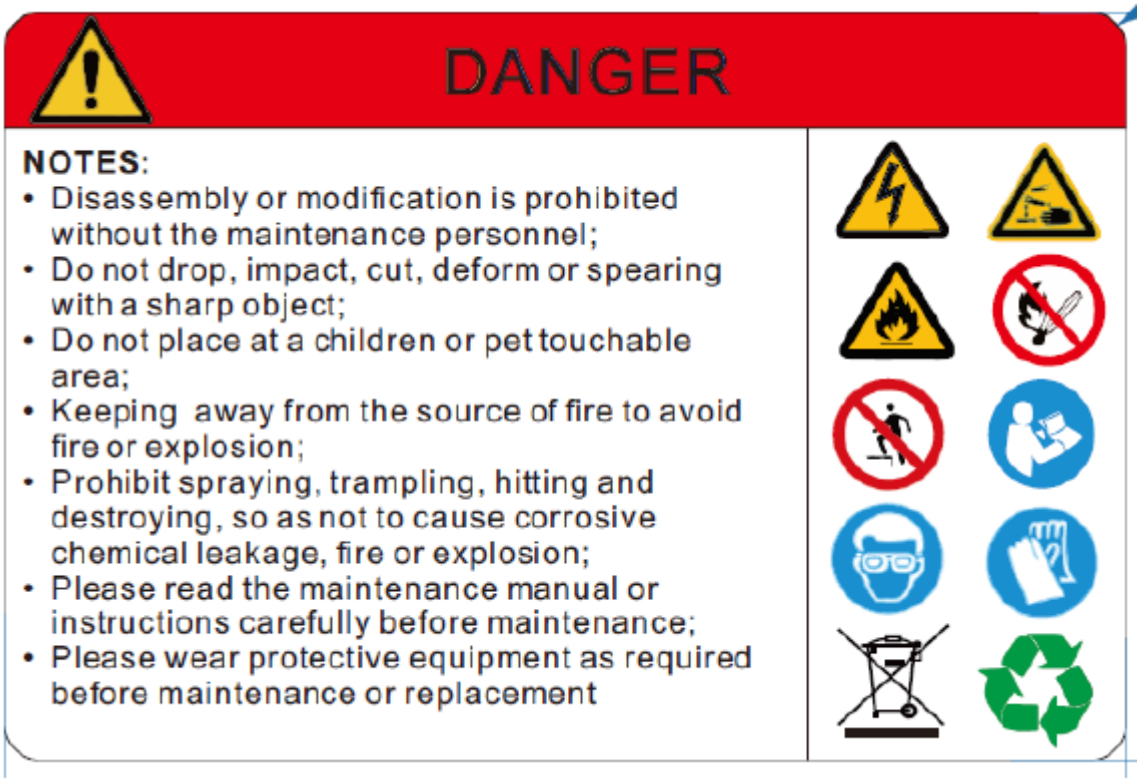
RCT power

Suzhou RCT Power Energy Technology Co.,Ltd
Email:info@rct-power.com.cn
Add:Unit01 and 02,Building B,No.28,Yongchang Road,Caohu Street, Suzhou,Jiangsu,P.R.China

Model	CESS699-375-01D
Manufacturer/Date	RCT Power /(xx/2024)
Serial Number of Unit	
Battery Chemistry	$LiFePO_4$
DC Voltage Range	715~928.2Vd.c.
Max.Storage Capacity/Nominal Voltage	699kWh / 832Vd.c.
PCS AC Rate Power/Current/Max Current	375kW/540A/594A
Nominal Grid/Load/Voltage/Frequency	400Va.c.(3P+N+PE)/ 50/60Hz
AUX.Power/Voltage/Frequency	9.6kW / 230Va.c. Max / 50/60Hz
Rated Short-Time Withstand Current	20kA/1s
Rated Operating Short-Circuit Breaking Capacity	50kA
Protection Class	I
Ingress Protection	IP54 (Battery Room IP55)
Dimensions(mm)/Weight	W2991*D2438*H2591(mm)/
Operating Temperature Range	-20 to 45℃

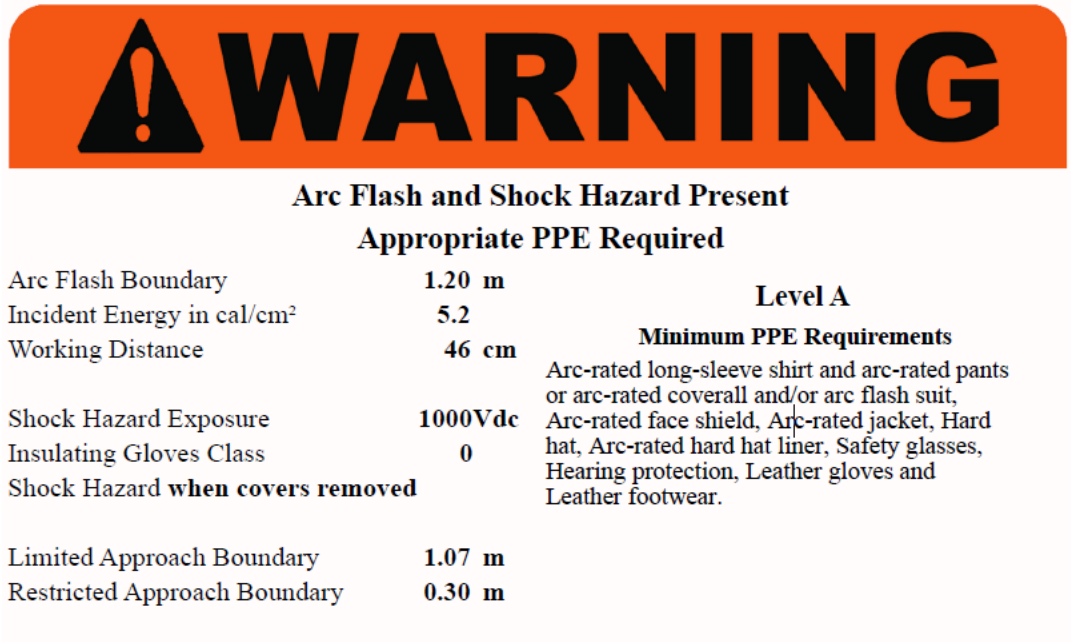


Warning label:











Importer:

Telephone:

Address:

Eu importer information will be provided prior to marketing in the EU.

Possible test case verdicts:

- test case does not apply to the test object..... : N/A
- test object was not evaluated for the requirement.... : N/E
- test object does meet the requirement ..... : Pass (P)
- test object does not meet the requirement ..... : Fail (F)

Testing:

Date of receipt of test items..... : See cover page

Date(s) of performance of tests..... : See cover page

General remarks:

"(see Attachment #)" refers to additional information appended to the report.

"(see appended table)" refers to a table appended to the report.

The tests results presented in this report relate only to the object tested.

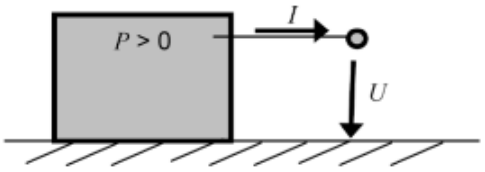
This report shall not be reproduced except in full without the written approval of the testing laboratory.

List of test equipment must be kept on file and available for review.

Additional test data and/or information provided in the attachments to this report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Generator reference system:



Manufacturer's Declaration per sub-clause 6.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided:

☐ Yes

☒ Not applicable

Manufacturer's Declaration per sub-clause 6.2.5 of IECEE 02:

When differences exist; they shall be identified in the General product information section.

Brief description:

The system is mainly applied in industrial and commercial scenarios.

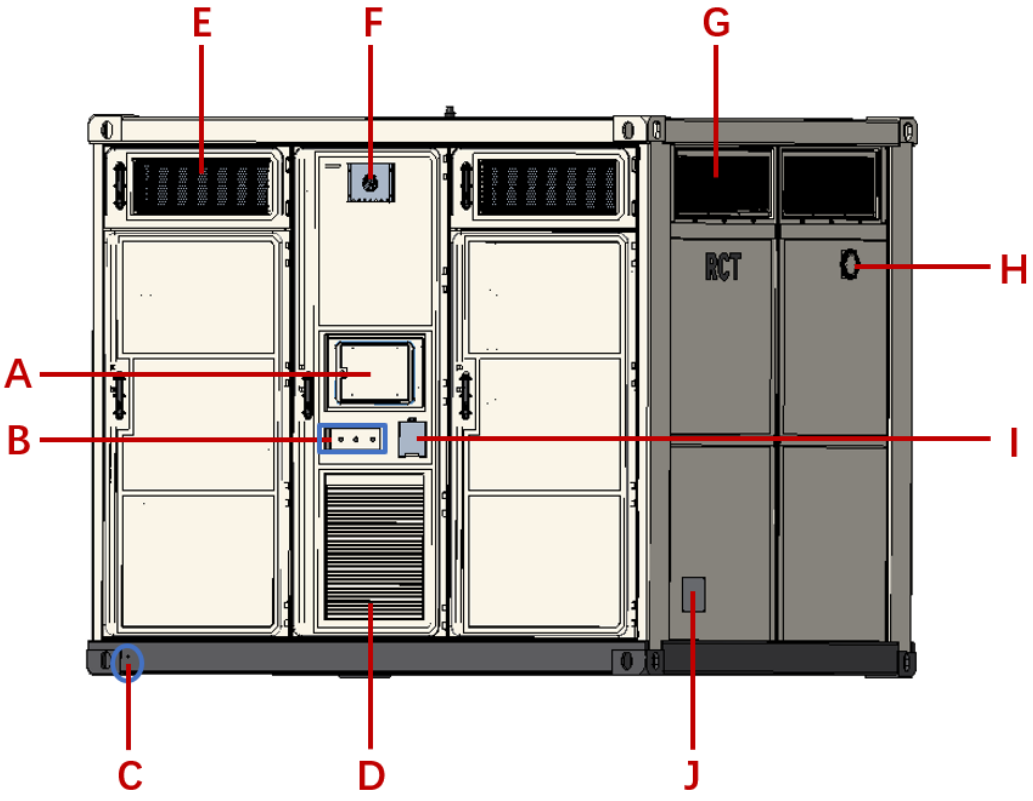
1. The system described in this report are one series of AC Energy Storage System which include two to four battery racks with PCSs, auxiliary power system, liquid-cooling system for battery racks and PCS, air conditioner for dehumidification, and fire suppression system.
   a) The auxiliary power box is for providing the auxiliary power for whole BMS control system, liquid-cooling system.
   b) Each battery rack connected to one PCS which converts the DC power generated by the energy storage batteries into AC power. The battery rack can also store energy from AC grid. The AC branches converge through busbar.
   c) The difference between each model is the number of battery racks and PCSs, details refer to the model list.
2. The insulation between the DC circuit and the metal enclosure is basic insulation. And the insulation between the DC circuit and communication ports is reinforced insulation or double insulation. OVC II considered for the battery rack, OVC III for PCS, Mains, and auxiliary power.
3. The IP rating of the EUT is IP54(IP55 for Battery room), PD 2 inside and PD 3 outside evaluated.
4. The BMS functional safety was evaluated according to IEC 60730-1 Annex H.
5. The battery racks were certified to EN IEC 62619, IEC 63056, refer to report no. CN24VXEB 001 and EN 62477-1, refer to report no. CN24DRLH 001. The Energy Storage System has been certified to EN 62477-1, refer to CN24MAWD 001.
6. The PCS (JTES-PCS125K-1000/400-L05C1) was certified individually by TÜ V Rheinland Co., Ltd.

Insulation structure description of the Energy Storage System

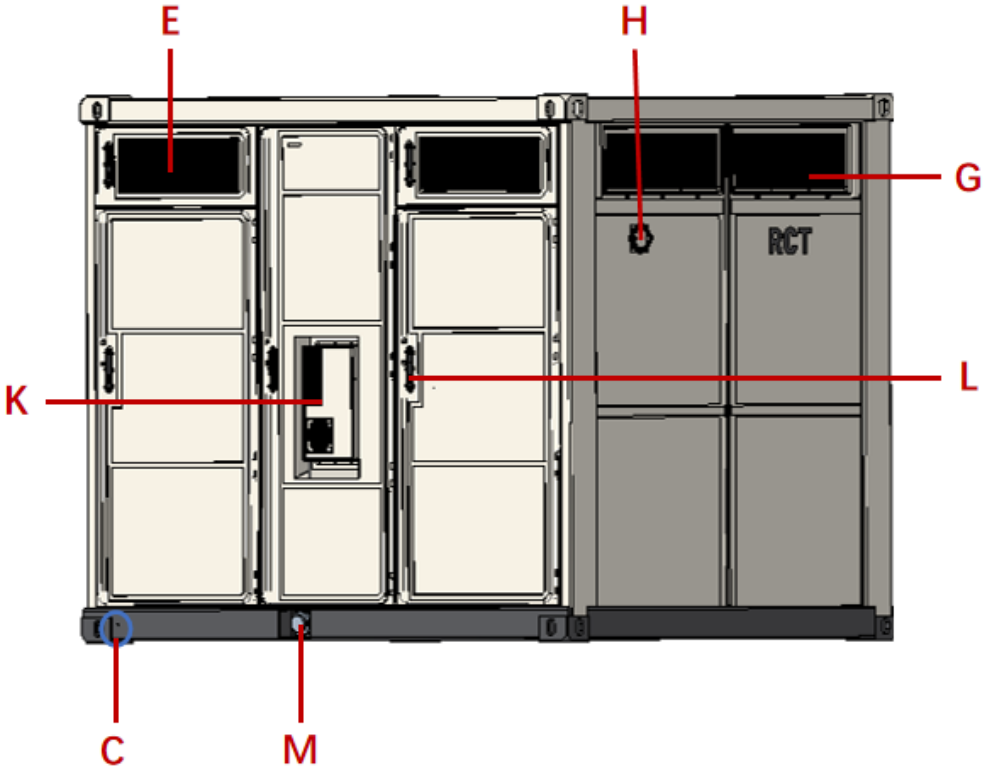
The Battery container is designed as isolation type. Please see the classification of circuit as below
- Primary circuit: Battery input/output, AC input/output, Auxiliary power input
- SELV circuit: External communication circuit of BMS control box and battery packs

Therefore
- Basic insulation between Primary circuit and earthed metal chassis
- Double/reinforced insulation between Primary circuit and SELV circuit, details see below table

The main electrical equipment:

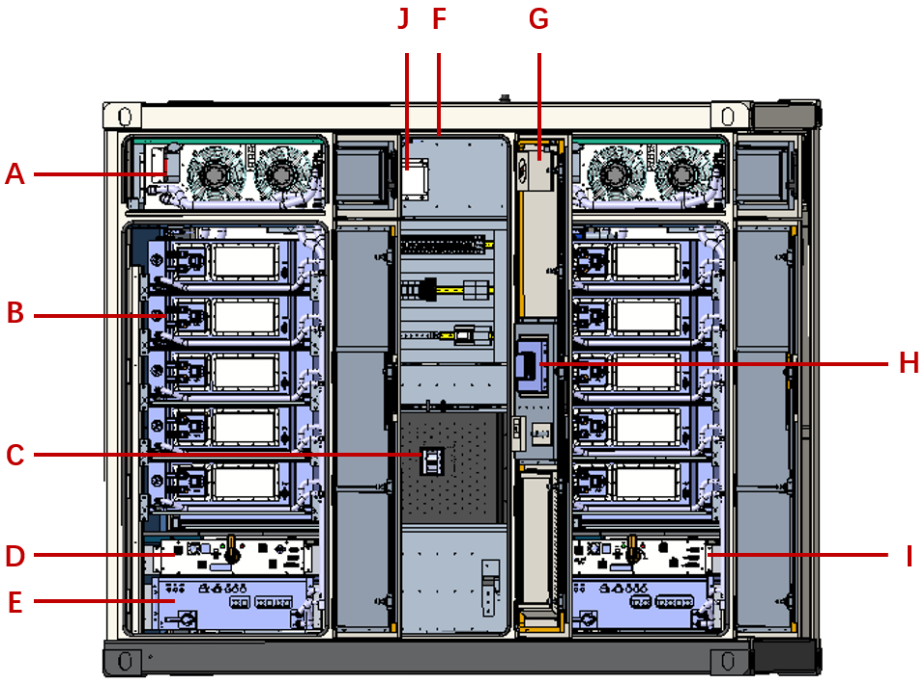


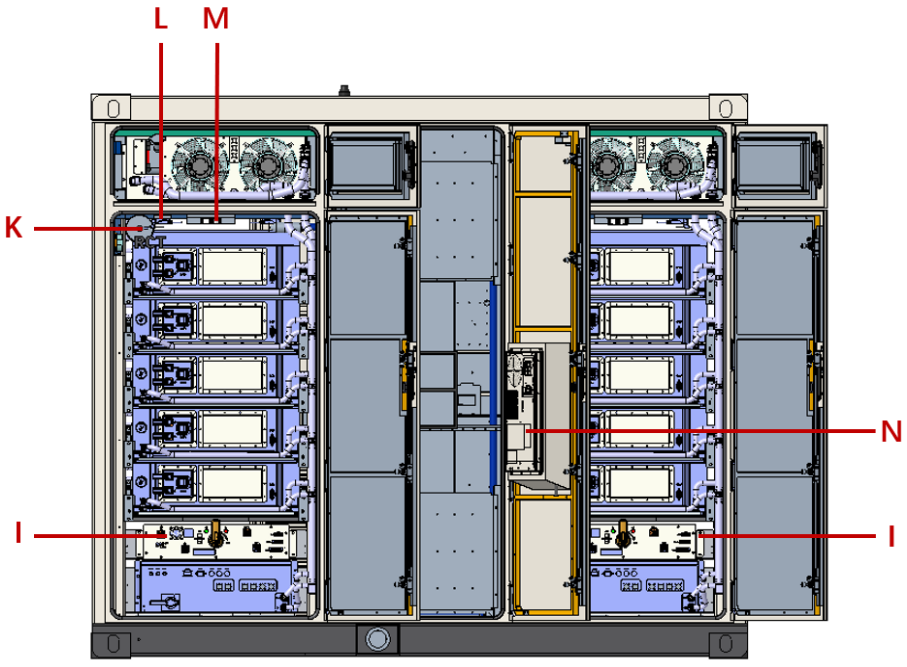
Front and left side with door open view



Back and Left View

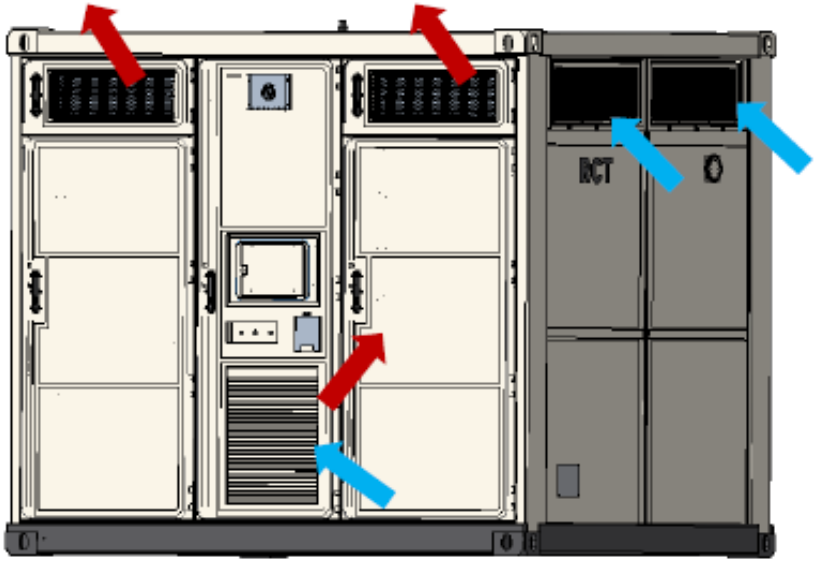
A. Touch panel cover; B. Indicator Light & Emergency stop button; C. Grounding point; D. Air grill; E. Chiller air outlet grill; F. Strobe and siren; G. Chiller air intake grill; H. Explosion proof valve. I.Fire switch;J.Name plate; K. Air conditioner; L.Door lock; M.Water inlet



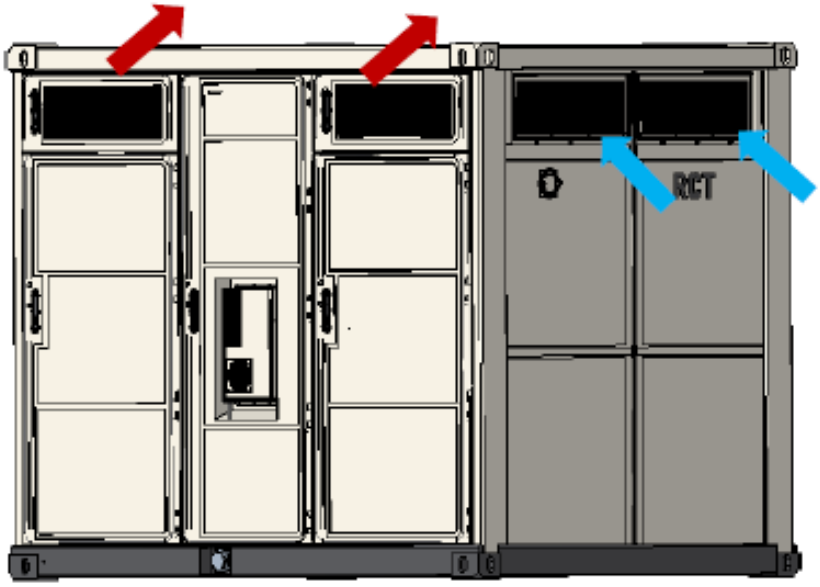


A. Chiller; B. Battery pack; C. Grid connection MCCB; D. Switch gear; E. AC/DC inverter; F. Illumination; G. Strobe and siren; H. Touch panel; I. Switch gear; J. Fire control unit; K. Aerosol fire suppression; L. Door switch; M. Composite detector; N. Air conditioner

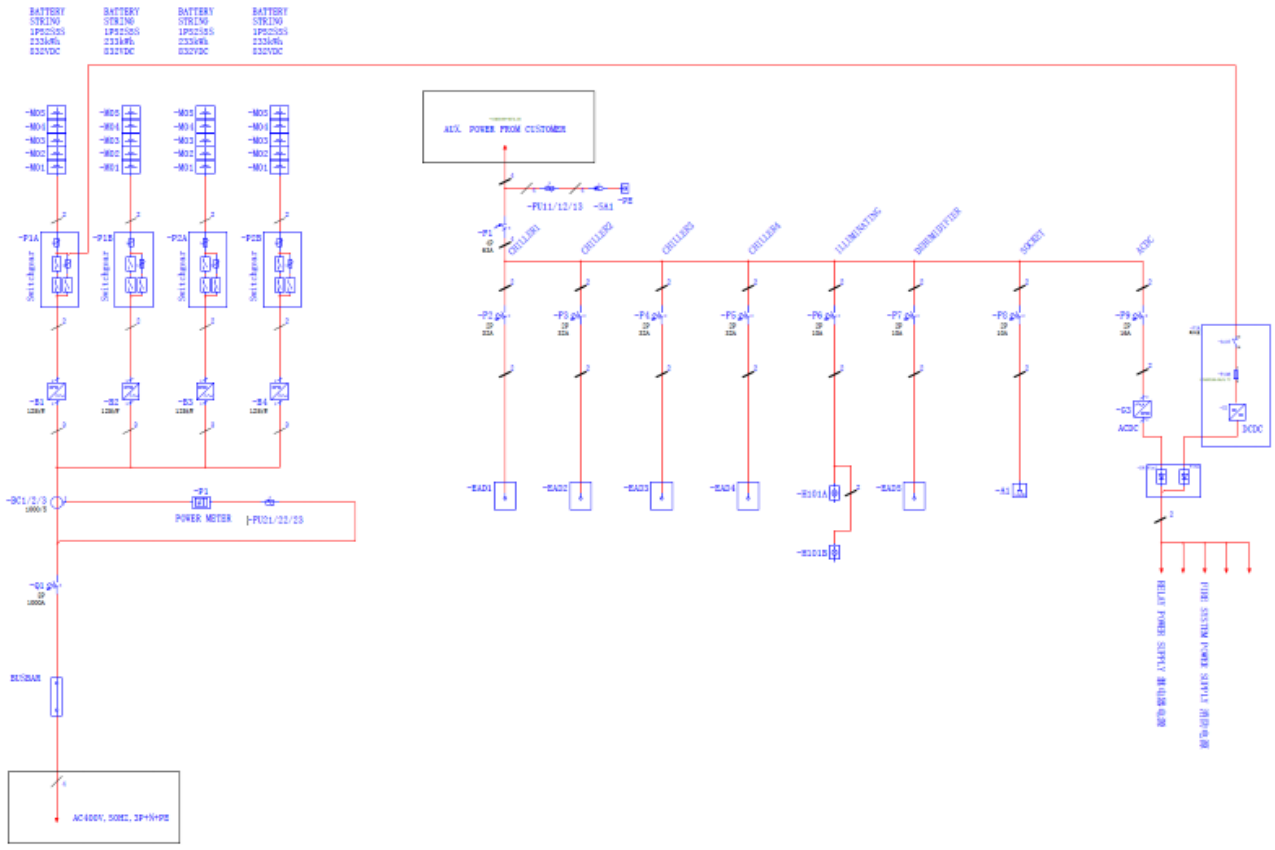
Air inlet and outlet



Front and Right View



Back and Left View



System diagram block for CESS932-500-01D

Model list:

MODELS LIST		CESS932-500-01D	CESS699-375-01D	CESS466-250-01D
DC side	Operating voltage range [Vd.c.]	715-928.2		
	Battery Nominal Voltage [Vd.c.]	832		
	Rated capacity	931840Wh	698880Wh	465920Wh
	Maximum charging and discharging current [A]	175.7*4	175.7*3	175.7*2
	Maximum charging and discharging power [kW]	116.48*4	116.48*3	116.48*2
	Structure	RACK-233L1D-IEC-21*1+ RACK-233L1D-IEC-20*3	RACK-233L1D-IEC-21*1+ RACK-233L1D-IEC-20*2	RACK-233L1D-IEC-21*1+ RACK-233L1D-IEC-20*1
AC side	PCS Model	JTES-PCS125K-1000/400-L05C1*4	JTES-PCS125K-1000/400-L05C1*3	JTES-PCS125K-1000/400-L05C1*2
	Rated H.V. voltage [Va.c.]	400(3P+N+PE)		
	Rated H.V. current [Aa.c.]	720	540	360
	Rated grid frequency [Hz]	50/60		
	Max. Current [A.a.c.]	792	594	396
	Rated AC power [kVA]	500	375	250
	Overvoltage Category (OVC)	III		
AUX power	Rated voltage [Va.c.]	3x230, 400 Va.c., 3P+N		
	Max Power[kVA]	9.6		
	Rated frequency [Hz]	50/60		
	Overvoltage Category (OVC)	III		
Battery Energy Storage System	IP rating/ Enclosure index / type	IP 54(Battery Room IP55)		
	Protective Class	I		
	Operating Temperature Range [℃]	-20℃ to +45 ℃		
	Pollution degree (PD)	External PD3/Internal PD 2	External PD3/Internal PD 2	External PD3/Internal PD 2
	Altitude [m]	2000		
	Weight [kg]	11600	9700	7800
	Size (W x D x H) [mm]	W2991*D2438*H2591		

Test conditions:
Temperature: 25℃ Relative humidity: 65%
Serial number: 1040016947240002
Firmware version: EMS3.0

EN 50549-2: 2019+A1			
Clause	Requirement – Test	Result - Remark	Verdict
4	**Requirements on generating plants**		**P**
4.1	**General**		**P**
	This clause defines the requirements on generating plants to be operated in parallel with the distribution network. Where settings or a range of configurability is provided and respecting the legal framework the configurations and settings may be provided by the DSO. Where no settings are provided by the DSO, the specified default settings shall be used; if no default settings are provided, the producer shall propose settings and inform the DSO.	Noticed.	P
4.2	**Connection scheme**		**P**
	The generating plant shall be in compliance with the requirements of the DSO. Different requirements may be subject to agreement between the producer and the DSO depending on the power system needs.	Considered.	P
4.3	**Choice of switchgear**		**P**
4.3.1	General		N/A
	Switches shall be chosen based on the characteristics of the power system in which they are intended to be installed.	Disconnecting device is not integral part of the unit. The installation instructions specify a disconnection device for the final installation. The correct assembling is part of the installer.	N/A
4.3.2	Interface switch		P
	Switches shall be power relays, contactors or mechanical circuit breakers each having a breaking and making capacity corresponding to the rated current of the generating plant and corresponding to the short circuit contribution of the generating plant. NOTE For PV-inverters further requirements are stated in EN 62109-1 and -2 with respect to the interface switch.	The unit provides two integrated relays in series for phase. Each device can be switched.	P
4.4	**Normal operating range**		**P**
4.4.1	General		P
	Generating plants when generating power shall have the capability to operate in the operating ranges specified below regardless the topology and the settings of the interface protection.	See 4.4.2 to 4.4.4.	P
4.4.2	Operating frequency range		P

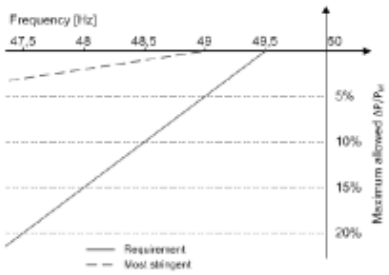
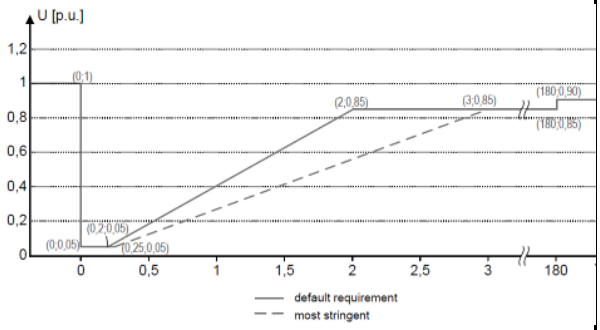
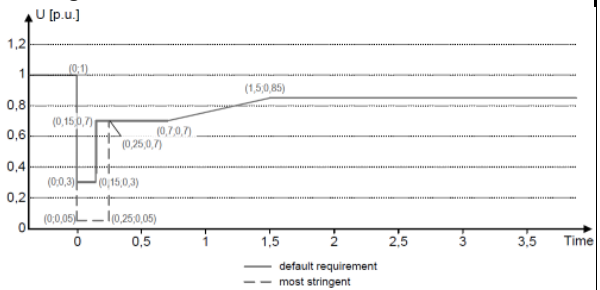
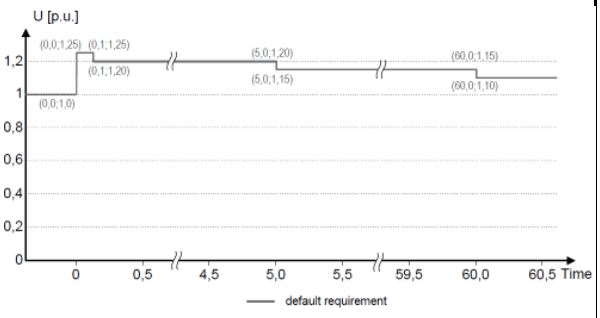
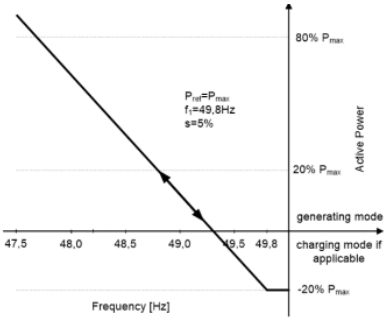
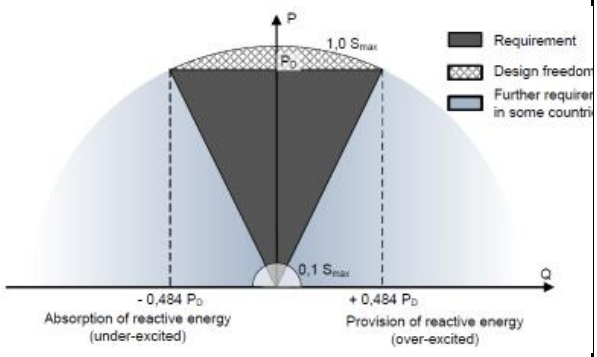
<table>
<tr><th colspan="4">EN 50549-2: 2019+A1</th></tr>
<tr><th>Clause</th><th>Requirement – Test</th><th>Result - Remark</th><th>Verdict</th></tr>
<tr><td></td><td>The generating plant shall be capable to operate continuously when the frequency at the point of connection stays within the range of 49 Hz to 51 Hz.
In the frequency range from 47 Hz to 52 Hz the generating plant should be capable to operate until the interface protection trips. Therefore, the generating plant shall at least be capable to operate in the frequency ranges and for the duration as for the minimum requirement indicated in Table 1.
Table 1 — Minimum time periods for operation in under-frequency situation
<table>
<tr><th>Frequency Range</th><th>Time period for operation
Minimum requirement</th><th>Time period for operation
Most stringent requirement</th></tr>
<tr><td>47,0 Hz – 47,5 Hz</td><td>not required</td><td>20 s</td></tr>
<tr><td>47,5 Hz – 48,5 Hz</td><td>30 min [a]</td><td>90 min</td></tr>
<tr><td>48,5 Hz – 49,0 Hz</td><td>30 min [a]</td><td>90 min [a]</td></tr>
<tr><td>49,0 Hz – 51,0 Hz</td><td>Unlimited</td><td>Unlimited</td></tr>
<tr><td>51,0 Hz – 51,5 Hz</td><td>30 min [a]</td><td>90 min</td></tr>
<tr><td>51,5 Hz – 52,0 Hz</td><td>not required</td><td>15 min</td></tr>
<tr><td colspan="3">[a]: Respecting the legal framework, it is possible that longer time periods are required by the relevant authority in some synchronous areas.</td></tr>
</table></td><td>See appended table.</td><td>P</td></tr>
<tr><td>4.4.3</td><td>Minimal requirement for active power delivery at under-frequencies</td><td></td><td>P</td></tr>
<tr><td></td><td>A generating plant shall be resilient to reductions of frequency at the point of connection while reducing the maximum active power as little as possible.
The admissible active power reduction due to under-frequency below 49,5 Hz is limited by a reduction rate of 10 % of the momentary power P_M per 1 Hz frequency drop as given by the full line in Figure 3.
 

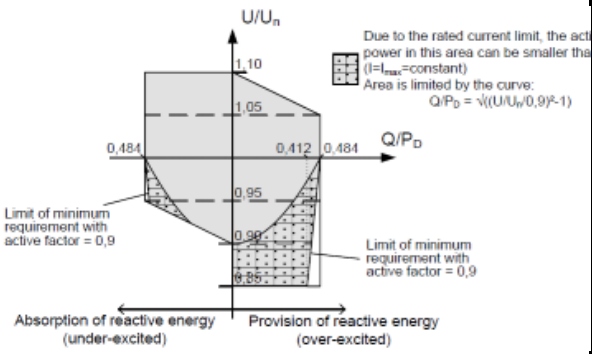
Figure 3 — Maximum allowable power reduction in case of under-frequency</td><td>See appended table.</td><td>P</td></tr>
<tr><td>4.4.4</td><td>Continuous operating voltage range</td><td></td><td>P</td></tr>
<tr><td></td><td>The generating plant when generating power shall be capable to operate continuously when the voltage at the point of connection stays within the range of 85 % Un to 110 % Un In case of voltages below Un, it is allowed to reduce the apparent power to maintain the current limits of the generating plant. The reduction shall be as small as technically feasible.</td><td>See appended table.</td><td>P</td></tr>
<tr><td>4.5</td><td>Immunity to disturbances</td><td></td><td>P</td></tr>
</table>

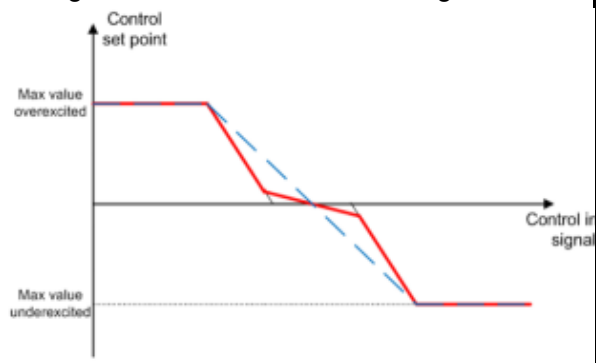
EN 50549-2: 2019+A1			
Clause	Requirement – Test	Result - Remark	Verdict
4.5.1	General		P
	The following withstand capabilities shall be fulfilled regardless the topology and the settings of the interface protection.	See 4.5.2 to 4.5.4.	P
4.5.2	Rate of change of frequency (ROCOF) immunity		P
	The generating modules in a generating plant shall have ROCOF immunity for a ROCOF equal or exceeding the value specified by the responsible party. If no ROCOF immunity value is specified, the following ROCOF immunity shall apply, making distinction between generating technologies: • Non-synchronous generating technology: at least 2 Hz/s • Synchronous generating technology: at least 1 Hz/s	See appended table.	P
4.5.3	Unde-voltage ride through (UVRT)		P
4.5.3.1	General		P
	Generating plants shall contribute to overall power system stability by providing also immunity towards dynamic voltage changes.		P
4.5.3.2	Generating plant with non-synchronous generating technology		P
	Generating modules shall be capable of remaining connected to the distribution network as long as the voltage at the point of connection remains above the voltage-time curve of Figure 6. The voltage is relative to Un.  **Figure 6 — Under-voltage ride through capability for non-synchronous generating technology**	See appended table.	P
4.5.3	Generating plant with synchronous generating technology	Not such type of unit.	N/A

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Clause	Requirement – Test	Result - Remark	Verdict
	Generating modules shall be capable of staying connected to the distribution network as long as the voltage at the point of connection remains above the voltage-time curve of Figure 7. The voltage is relative to Un.  **Figure 7 — Under-voltage ride through capability for synchronous generating technology**		N/A
4.5.4	Over-voltage ride through (OVRT)		P
	Generating modules, except for micro-generating plants, shall be capable of staying connected to the distribution network as long as the voltage at the point of connection remains below the voltage-time curve of Figure 8.  **Figure 8 — Over-voltage ride through capability**	See appended table.	P
4.6	**Active response to frequency deviation**		**P**
4.6.1	Power response to over-frequency		P

EN 50549-2: 2019+A1			
Clause	Requirement – Test	Result - Remark	Verdict
	The generating unit shall be capable of activating active power response to over-frequency at a programmable frequency threshold f1 at least between and including 50.2 Hz and 52 Hz with a programmable droop in a range of at least 2 % to 12 %. The droop reference is Pref. Unless defined differently by the responsible party: • $P_{ref}=P_{max}$, in the case of synchronous generating technology and electrical energy storage systems. • $P_{ref}=P_M$, the actual AC output power at the instant when the frequency reaches the threshold f_1, in the case of all other non-synchronous generating technology The resolution of the frequency measurement shall be +/- 10 mHz or less. After activation, the active power frequency response shall be delivered with an accuracy of ±10 % of the nominal power.	See appended table.	P
4.6.2	**Power response to underfrequency**		P
	The active power response to underfrequency shall be delivered at a programmable frequency threshold f1 at least between and including 49.8 Hz and 46.0 Hz with a programmable droop in a range of at least 2 % to 12 %. The generating unit shall be capable of activating active power response to underfrequency as fast as technically feasible with an intrinsic dead time that shall be as short as possible with a maximum of 2 s and with a step response time of maximum 30 s unless another value is defined by the relevant party. After activation, the programmed droop with an accuracy of ±10 % of the nominal power. The resolution of the frequency measurement shall be ±10 mHz or less.  Figure 11 — Example of active power frequency response to underfrequency in case of stora device with 20 % power charging at passing of threshold frequency f_1	See appended table.	P
4.7	**Power response to voltage changes**		P
4.7.1	General		P

EN 50549-2: 2019+A1			
Clause	Requirement – Test	Result - Remark	Verdict
	The capability to contribute to voltage support by means of management of reactive and/or active power by the generating plant may be required by the DSO.	See appended table.	P
4.7.2	Voltage support by reactive power		P
4.7.2.1	General		P
	Generating plants shall not lead to voltage variations out of acceptable limits. These limits should be defined by national regulation. Generating units and plants shall be able to contribute to meet this requirement during normal network operation.	See 4.7.2.2 to 4.7.2.3.	P
4.7.2.2	Capabilities	See below.	P
	Unless specified differently below, for specific generating technologies, generating plants shall be able to operate with active factors as defined by the DSO and the responsible party from active factor = $0.90_{underexcited}$ to active factor= $0.90_{overexcited}$  **Figure 12 — Reactive power capability at nominal voltage**	See appended table.	P
	The reactive power capability shall be evaluated at the terminals of the/each generating unit CHP generating units with a capacity ≤ 150 kVA shall be able to operate with active factors as defined by the DSO from cos φ = $0.95_{under-excited}$ to cos φ = $0.95_{over-excited}$.	Not such type of unit.	N/A
	Generating units with an induction generator coupled directly to the grid and used in generating plants above micro generating level, shall be able to operate with active factors as defined by the DSO from cos φ = $0.95_{under-excited}$ to cos φ = 1 at the terminals of the unit. Deviating from 4.7.2.3 only the cos φ set point mode is required. Deviating from the accuracy requirements below, the accuracy is only required at active power P_D.	Not such type of unit.	N/A

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Clause	Requirement – Test	Result - Remark	Verdict
	Generating units with an induction generator coupled directly to the grid and used in micro generating plants shall operate with an active factor above 0,95 at the terminals of the generating unit. A controlled voltage support by reactive power is not required from this technology.	Not such type of unit.	N/A
	Generating units with linear generators, coupled directly and synchronously to the grid shall operate with an active factor above 0,95 at the terminals of the generating unit, and therefore a controlled voltage support by reactive power is not required from this technology.	Not such type of unit.	N/A
	When operating above the apparent power threshold Smin equal to 10 % of the maximum apparent power Smax or the minimum regulating level of the generating plant, whichever is the higher value, the reactive power capability shall be provided with an accuracy of ±2 % S_{max}. Up to this apparent power threshold S_{min}, deviations above 2 % are permissible. For generating units with a reactive power capability according Figure 12 the reactive power capability at active power P_D shall be at least according Figure 13. For generating units with a reduced reactive power capability Figure 13 is only applicable up to the maximum reactive power capability.  **Figure 13 — Reactive power capability at active power P_D in the voltage range (positive sequence component of the fundamental)**	See appended table.	P
4.7.2.3	Control modes.		P
4.7.2.3.1	General		P
	If actually required, the form of the contribution to voltage control shall be specified by the DSO. The control modes are exclusive; only one mode may be active at a time. • Q setpoint mode • Q (U) • Cos φ setpoint mode • Cos φ (P)	See 4.7.2.3.2 to 4.7.3.	P

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Clause	Requirement – Test	Result - Remark	Verdict
4.7.2.3.2	Setpoint control modes (Cos φ setpoint mode)		P
	Q setpoint mode and cos φ setpoint mode control the reactive power output and the cos φ of the output respectively, according to a set point set in the control of the generating plant/unit. In the case of change of the set point local or by remote control the settling time for the new set point shall be less than one minute.	See appended table.	P
4.7.2.3.3	Voltage related control modes (Q (U))		P
	The voltage related control mode Q (U) controls the reactive power output as a function of the voltage. There is no preferred state of the art for evaluating the voltage. Therefore it is the responsibility of the generating plant designer to choose a method. One of the following methods should be used: • the positive sequence component of the fundamental; • the average of the voltages measured independently for each phase to neutral or phase to phase; • phase independently the voltage of every phase to determine the reactive power for every phase. For voltage related control modes, a characteristic with a minimum and maximum value and three connected lines according to Figure 16 shall be configurable.	See appended table.	P
4.7.2.3.4	Power related Control mode:		P
	The power related control modes Q (P) and cos φ (P) control the reactive power output and the cos φ of the outptu respectively as a function of the active power output. For power related control modes, a characteristic with a minimum and maximum value and three connected lines shall be configurable in accordance with Figure 16.  **Figure 16 — Example characteristics for Q respectively cos φ control mode**	See appended table.	P

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Clause	Requirement – Test	Result - Remark	Verdict
4.7.3	Voltage related active power reduction		P
	In order to avoid disconnection due to a maximum voltage protection (see 4.9.3.3 and 4.9.3.4), generating plants/units are allowed to reduce active power output as a function of this rising voltage. The final implemented logic can be chosen by the manufacturer. Nevertheless, this logic shall not cause steps or oscillations in the output power.	The interface protection device was incorporated into the microgenerator control system. See appended table.	P
4.7.4	Short circuit current requirements on generating plants		P
4.7.4.1	General		P
	Generating modules classified as type B modules according to COMMISSION REGULATION 2016/631 shall comply with the requirements of 4.7.4.2 and 4.7.4.3. Generating modules classified as type A according to COMMISSION REGULATION 2016/631 should comply with these requirements. The actual behaviour of type A modules shall be specified in the connection agreement.	Considered.	P
4.7.4.2	Generating plant with non-synchronous generating technology		P
4.7.4.2.1	Voltage support during faults and voltage steps		P
	In general no voltage support during faults and voltage steps is required from generating plants connected in LV distribution networks as the additional reactive current is expected to interfere with grid protection equipment. If the responsible party requires voltage support during faults and voltage steps for generating plants of type B connected to LV distribution grids, the clause 4.7.4 of EN 50549-2 applies.		P
4.7.4.2.2	Zero current mode for converter connected generating technology		P
	If UVRT capability (see 4.5.3) is provided additional to the requirements of 4.5, generating units connected to the grid by a converter shall have the capability to reduce their current as fast as technically feasible down to or below 10 % of the rated current when the voltage is outside of a static voltage range. Generating units based on a doubly fed induction machine can only reduce the positive sequence current below 10 % of the rated current. Negative sequence current shall be tolerated during unbalanced faults. In case this current reduction is not sufficient, the DSO should choose suitable interface protection settings.	See appended table.	P

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Clause	Requirement – Test	Result - Remark	Verdict
	The static voltage range shall be adjustable from 20 % to 100 % of U_n for the undervoltage boundary and from 100 % to 130 % of U_n for the overvoltage boundary. The default setting shall be 50% of U_n for the undervoltage boundary and 120% of U_n for the overvoltage boundary. Each phase to neutral voltage or if no neutral is present each phase to phase voltage shall be evaluated. At voltage re-entry into the voltage range, 90% of pre-fault power or available power, whichever is the smallest, shall be resumed as fast as possible, but at the latest according to 4.5.3 and 4.5.4.	See appended table.	P
4.7.4.2.3	Induction generator based units	Not such type of unit.	N/A
	In general no voltage support during faults and voltage steps is required from generating plants connected in LV distribution networks as the additional reactive current is expected to interfere with grid protection equipment. If the responsible party requires voltage support during faults and voltage steps for generating plants of type B connected to LV distribution grids, the clause 4.7.4 of EN50549-2 applies.		N/A
4.7.4.3	Generating plant with synchronous generating technology - Synchronous generator based units	Not such type of unit.	N/A
	In general no voltage support during faults and voltage steps is required from generating plants connected in LV distribution networks as the additional reactive current is expected to interfere with grid protection equipment. If the responsible party requires voltage support during faults and voltage steps for generating plants of type B connected to LV distribution grids, the clause 4.7.4 of EN50549-2 applies.		N/A
4.8	**EMC and power quality**		**P**
	Similar to any other apparatus or fixed installation, generating units shall comply with the requirements on electromagnetic compatibility established in Directive 2014/30/EU or 2014/53/EU, whichever applies. EMC limits and tests, described in EN 61000 series, have been traditionally developed for loads, without taking into account the particularities of generating units, such as their capability to create overvoltages or high frequency disturbances due to the presence of power converters, which were either impossible or less frequent in case of loads.	See EMC report	P
	• Harmonic emissions;	See appended table.	P
	• Flicker and voltage fluctuations;	See appended table.	P
	• DC injection;	See appended table.	P

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Clause	Requirement – Test	Result - Remark	Verdict
	• Short and long duration overvoltages emission;		N/A
	• Switching frequency emission;		N/A
	• Immunity to voltage dips and short interruptions;		N/A
	• Immunity to frequency variation		N/A
	• Immunity to harmonics and inter-harmonics;	See appended table.	P
	• Unbalance.	See appended table.	P
4.9	**Interface protection**		**P**
4.9.1	**General**		P
	This automatic means of disconnection has following main objectives: • prevent the power production of the generating plant to cause an overvoltage situation in the distribution network it is connected to. Such overvoltages could result in damages to the equipment connected to the distribution network as well as the distribution network itself; • detect unintentional island situations and disconnect the generating plant in this case. This is contributing to prevent damage to other equipment, both in the producers' installations and the distribution network due to out of phase re-closing and to allow for maintenance work after an intentional disconnection of a section of the distribution network; • assist in bringing the distribution network to a controlled state in case of voltage or frequency deviations beyond corresponding regulation values.	The integrated protection provided to detect abnormal condition (Out of range for AC voltage, frequency, and unintentional island). It can disconnect from grid while abnormal condition is happened.	P
	It is not the purpose of the interface protection system to: • disconnect the generating plant from the distribution network in case of faults internal to the power generating plant. Protection against internal faults (short-circuits) shall be coordinated with network protection, according to DSO protection criteria. Protection against e.g. overload, electric shock and against fire hazards shall be implemented additionally according to HD 60364-1 and local requirements; • prevent damages to the generating unit due to incidents (e.g. short circuits) on the distribution network	See above.	P

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Clause	Requirement – Test	Result - Remark	Verdict
4.9.2	Void		N/A
4.9.3	Requirements on voltage and frequency protection	.	P
4.9.3.1	General		P
	Part or all of the following described functions may be required by the DSO. The protection functions shall evaluate at least all phases where generating units, covered by this protection system, are connected to. In case of three phase generating units/plants and in all cases when the protection system is implemented as an external protection system in a three phase power supply system, all phase to phase voltages and, if a neutral conductor is present, all phase to neutral voltages shall be evaluated. The minimum required accuracy for protection is: ● for frequency measurement ±0.05 Hz; ● for voltage measurement ±1% of U_n.	The frequency range, voltage range, observation time, and power gradient can be adjustable in display panel. It can be protected by password, and adjusted by local distributor.	P
4.9.3.2	Undervoltage protection [27]		P
	The protection shall comply with EN 60255-127. The evaluation of the r.m.s. or the fundamental value is allowed.	See appended table.	P
4.9.3.3	Overvoltage protection [59]		P
	The protection shall comply with EN 60255-127. The evaluation of the r.m.s. or the fundamental value is allowed.	See appended table.	P
4.9.3.4	Overvoltage 10 min mean protection		P
	The calculation of the 10 min value shall comply with the 10 min aggregation of EN 61000-4-30 Class S, but deviating from EN 61000-4-30 as a moving window is used. Therefore the function shall be based on the calculation of the square root of the arithmetic mean of the squared input values over 10 min. The calculation of a new 10 min value at least every 3 s is sufficient, which is then to be compared with the threshold value.	See appended table.	P
4.9.3.5	Underfrequency protection [81<]		P
	Underfrequency protection may be implemented with two completely independent protection thresholds, each one able to be activated or not.	See appended table.	P
4.9.3.6	Overfrequency protection [81>]		P
	Underfrequency protection may be implemented with two completely independent protection thresholds, each one able to be activated or not.	See appended table.	P
4.9.4	Means to detect island situation		P

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Clause	Requirement – Test	Result - Remark	Verdict
4.9.4.1	General		P
	Besides the passive observation of voltage and frequency further means to detect an island might be required by the DSO. Detecting islanding situations shall not be contradictory to the immunity requirements of 4.5.	Considered. Active method of anti-island detection is AFD.	P
4.9.3.2	Active methods tested with a resonant circuit		P
	These are methods which pass the resonant circuit test according to Clause 5 or for PV inverters according to EN 62116.	See appended table.	P
4.9.4.3	Switch to narrow frequency band (see Annex E and Annex F)		P
	In case of local phenomena (e.g. a fault or the opening of circuit breaker along the line) the DSO in coordination with the responsible party may require a switch to a narrow frequency band to increase the interface protection relay sensitivity. In the event of a local fault it is possible to enable activation of the restrictive frequency window (using the two underfrequency/overfrequency thresholds described in 4.9.2.5 and 4.9.2.6) correlating its activation with another additional protection function.	The settings of field can be readable on the display panel. See instruction manual.	P
4.9.5	Digital input to the interface protection		N/A
	If required by the DSO, the interface protection shall have at least two configurable digital inputs. These inputs can for example be used to allow transfer trip or the switching to the narrow frequency band.	Must be taken under consideration for the installation.	N/A
4.10	**Connection and starting to generate electrical power**		**P**
4.10.1	General		P
	Connection and starting to generate electrical power is only allowed after voltage and frequency is within the allowed voltage range and the allowed frequency range for at least the specified observation time. It shall be impossible to overrule these conditions. The setting of the conditions depends on whether the connection is due to a normal operational start-up or an automatic reconnection after tripping of the interface protection.	Considered.	P
4.10.2	Automatic reconnection after tripping		P

<table>
<tr><th colspan="4">EN 50549-2: 2019+A1</th></tr>
<tr><th>Clause</th><th>Requirement – Test</th><th>Result - Remark</th><th>Verdict</th></tr>
<tr><td></td><td>The frequency range, the voltage range, the observation time shall be adjustable in the range according to Table 3 column 2. If no settings are specified by the DSO and the responsible party, the default settings for the reconnection after tripping of the interface protection are according to Table 3 column 3.
Table 3 — Automatic reconnection after tripping
<table><tr><th>Parameter</th><th>Range</th><th>Default setting</th></tr><tr><td>Lower frequency</td><td>47,0Hz – 50,0Hz</td><td>49,5Hz</td></tr><tr><td>Upper frequency</td><td>50,0Hz – 52,0Hz</td><td>50,2Hz</td></tr><tr><td>Lower voltage</td><td>50% – 100%U_n</td><td>85 % U_n</td></tr><tr><td>Upper voltage</td><td>100% – 120% U_n</td><td>110 % U_n</td></tr><tr><td>Observation time</td><td>10s – 600s</td><td>60s</td></tr><tr><td>Active power increase gradient</td><td>6% – 3000%/min</td><td>10%/min</td></tr></table></td><td>See appended table.</td><td>P</td></tr>
<tr><td>4.10.3</td><td>Starting to generate electrical power</td><td></td><td>P</td></tr>
<tr><td></td><td>The frequency range, the voltage range, the observation time shall be adjustable in the range according to Table 4 column 2. If no settings are specified by the DSO and the responsible party, the default settings for connection or starting to generate electrical power due to normal operational start-up or activity are according to Table 4 column 3.
Table 4 — Starting to generate electrical power
<table><tr><th>Parameter</th><th>Range</th><th>Default setting</th></tr><tr><td>Lower frequency</td><td>47,0Hz – 50,0Hz</td><td>49,5Hz</td></tr><tr><td>Upper frequency</td><td>50,0Hz – 52,0Hz</td><td>50,1Hz</td></tr><tr><td>Lower voltage</td><td>50% – 100% U_n</td><td>85 % U_n</td></tr><tr><td>Upper voltage</td><td>100% – 120% U_n</td><td>110 % U_n</td></tr><tr><td>Observation time</td><td>10s – 600s</td><td>60s</td></tr><tr><td>Active power increase gradient</td><td>6% – 3000%/min</td><td>disabled</td></tr></table></td><td>See appended table.</td><td>P</td></tr>
<tr><td>4.10.4</td><td>Synchronisation</td><td></td><td>P</td></tr>
<tr><td></td><td>Synchronizing a generating plant/unit with the distribution network shall be fully automatic i.e. it shall not be possible to manually close the switch between the two systems to carry out synchronization.</td><td>Complied. See appended table.</td><td>P</td></tr>
<tr><td>4.11</td><td>Ceasing and reduction of active power on set point</td><td></td><td>P</td></tr>
<tr><td>4.11.1</td><td>Ceasing active power</td><td></td><td>P</td></tr>
<tr><td></td><td>Generating plants with a maximum capacity of 0.8 kW or more shall be equipped with a logic interface (input port) in order to cease active power output within five seconds following an instruction being received at the input port.</td><td>See appended table.</td><td>P</td></tr>
<tr><td>4.11.2</td><td>Reduction of active power on set point</td><td></td><td>P</td></tr>
</table>

EN 50549-2: 2019+A1			
Clause	Requirement – Test	Result - Remark	Verdict
	A generation unit/plant shall be capable of carrying out the power output reduction to the respective limit within an envelope of not faster than 0.66% P_n/s and not slower than 0.33% P_n/s with an accuracy of 5 % of nominal power. Generating plants are permitted to disconnect from the network at a limit value below it minimum regulating level. If required by the DSO, this includes remote operation.	See appended table.	P
4.12	Remote information exchange		P
	Generating plants whose power is above a threshold to be determined by the DSO and the responsible party shall have the capacity to be monitored by the DSO or TSO control centre or control centres as well as receive operation parameter settings for the functions specified in this European Standard from the DSO or TSO control centre or control centres. This information exchange is aimed at allowing the DSO and/or the TSO to improve, optimize and make safer the operation of their respective networks.	Considered.	P
4.13	Requirements regarding single fault tolerance of interface protection system and interface switch		P
	If required in 4.3.2, the interface protection system and the interface switch shall meet the requirements of single fault tolerance. A single fault shall not lead to a loss of the safety functions. Faults of common cause shall be taken into account if the probability for the occurrence of such a fault is significant. Whenever reasonably practical, the individual fault shall be displayed and lead to the disconnection of the power generating unit or system.	See appended table.	P
Annex A (informative)	**Interconnection guidance**	Must be taken under consideration for the installation.	**N/A**
Annex B (informative)	**Void**		**N/A**
Annex C (informative)	**Parameter Table**	Considered, see 4.3 to 4.13.	**P**
Annex D (informative)	**List of national requirements applicable for generating plants**	Must be taken under consideration for the installation.	**N/A**
Annex E (informative)	**Loss of Mains and overall power system security**	Noticed.	**P**
Annex F (informative)	**Examples of protection strategies**	Noticed.	**P**

EN 50549-2: 2019+A1			
Clause	Requirement – Test	Result - Remark	Verdict
Annex G (normative)	**Abbreviations**	Noticed.	**P**
Annex H (informative)	**Relationship between this European standard and the COMMISSION REGULATION (EU) 2016/631**	Noticed.	**P**

- End of test report -

Liste der verwendeten Prüfmittel
List of used test equipment

Measurement and Test Equipment	MTE Type / model / Equipment No. / Internal ID	Next Calibration Date (yyyy.mm.dd)
Power analyzer	ESR-TC-054	2025.03.26
Power analyzer	ESR-TC-055	2025.03.26
Power analyzer	ESR-TC-250	2025.11.19
2000A current transformer	ESR-TC-086	2025.4.6
2000A current transformer	ESR-TC-087	2025.4.6
1000A current transformer	ESR-TC-066	2025.3.26
1000A current transformer	ESR-TC-067	2025.3.26
1000A current transformer	ESR-TC-068	2025.3.26
1000A current transformer	ESR-TC-069	2025.3.26
1000A current transformer	ESR-TC-070	2025.3.26
1000A current transformer	ESR-TC-071	2025.3.26
200A current transformer	ESR-TC-056	2025.3.26
200A current transformer	ESR-TC-064	2025.3.26
200A current transformer	ESR-TC-065	2025.3.26
200A current transformer	ESR-TC-057	2025.3.26
200A current transformer	ESR-TC-058	2025.3.26
200A current transformer	ESR-TC-059	2025.3.26
200A current transformer	ESR-TC-060	2025.3.26
200A current transformer	ESR-TC-061	2025.3.26
Datalogger	ESR-TC-247	2025.11.17
Datalogger	ESR-TC-248	2025.11.17
steel measuring tape	ESR-TC-245	2025.10.8
Leakage current test kit	ESR-TC-052	2025.3.26
Impulse tester	ESR-TC-074	2025.3.26
Safety tester	ESR-TC-053	2025.3.26
Digital display remote pressure gauge	ESR-ENG-001	2025.5.14
Digital push tension meter	ESR-TC-226	2025.8.11

Produktbeschreibung
Product description

See test report CN25EQ5Z 001 for detail.

ZUSATZ-DOKUMENTATION
ADDITIONAL DOCUMENTATION

5	*Testing*	
5.1	*General*	P
5.2	*Normal operating range*	P
5.3	*Immunity to disturbances*	P
5.4	*Active response to frequency deviation*	P
5.5	*Power specification and response to voltage variations*	P
5.6	*Voltage related active power reduction - P(U)*	P
5.7	*EMC and power quality*	P
5.8	*Interface protection*	P
5.9	*Connection and starting*	P
5.10	*Active power reduction on set point*	P
5.11	*Remote information exchange*	P
5.12	*Requirements regarding single fault tolerance of interface protection system and interface switch*	P
5.13	*Model definition and model validation for generating units of synchronous generating technology*	N/A

ZUSATZ-DOKUMENTATION
ADDITIONAL DOCUMENTATION

See following data for details.

Test Engineer:	5.1.2e	Reviewer:	5.1.2e
Signature:	5.1.2e	Signature:	5.1.2e

Testing Location:	
Name:	See Cover Page
Address:	See Cover Page

Test Sample No.:	See Cover Page

Test Condition:	See Cover Page

Test Date:	See Cover Page

Clause	Test items	Remark
5.2.1, 5.2.2	Normal operating range (Operation range)	P
5.3.1	Immunity to disturbances - Rate of change of frequency (ROCOF)	P
5.3.2	Phase jump	P
5.3.3	Immunity to disturbances - Fault ride through, over-voltage (OVRT) and under-voltage (UVRT)	P
5.4.3	Active response to frequency deviation	P
5.5.1	Power capabilities assessment	P
5.5.2	Voltage support by reactive power - test to determine the reactive power control modes	P
5.5.2.3	Verification procedure for Set point control	P
5.5.2.4	Verification procedure for voltage related control mode for reactive power Q(U)	P
5.5.2.5	Verification procedure for power related control modes for reactive power	P
5.6	Voltage related active power reduction - P(U)	P
5.7.2	Power Quality	P
5.8.3	Verification procedure for generating plants to be connected to a LV distribution network with Interface protection as internal device	P
5.8.5	Verification procedure for generating plants to be connected to a MV distribution network	P
5.8.6	Islanding detection	P
5.9.3	Automatic reconnection after tripping	P
5.9.4	Starting to generate electrical power	P
5.10	Active power reduction on set point	P
5.11	Remote information exchange	P
5.12	Requirements regarding single fault tolerance of interface protection system and interface switch	P
5.13	Model definition and model validation for generating units of synchronous generating technology	N/A

5.2.1, 5.2.2	TABLE: Normal operating range (Operation range)				
Test Conditions			Measurements	Target value	Limit
U/Un	f [Hz]	Time	Pmax/Pn	Pmax/Pn	Pmax/Pn
100%	47.5	5min	99.80%	100%	*≥80%*
100%	51.5	5min	99.75%	100%	*100%±5%*
100%	47.0	20s	99.75%	100%	*≥75%*
100%	52.0	5min	99.77%	100%	*100%±5%*
85%**	50.0	10min	99.87%	100%	*80%-105%*
90%***	50.0	10min	99.85%	100%	*85%-105%*
100%	50.0	10min	99.92%	100%	*100%±5%*
110%	50.0	10min	99.72%	100%	100%±5%

Note(s):

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

**: For 50549-1:85%

***: For 50549-2:90%

5.3.1	TABLE: Immunity to disturbances - Rate of change of frequency (ROCOF)		P
Test Condition		Measurement	Limit
f [Hz]	Time [s]		Connect
50	3	No Disconnection	Connect
51	3	No Disconnection	Connect
49	3	No Disconnection	Connect
50	6	No Disconnection	Connect

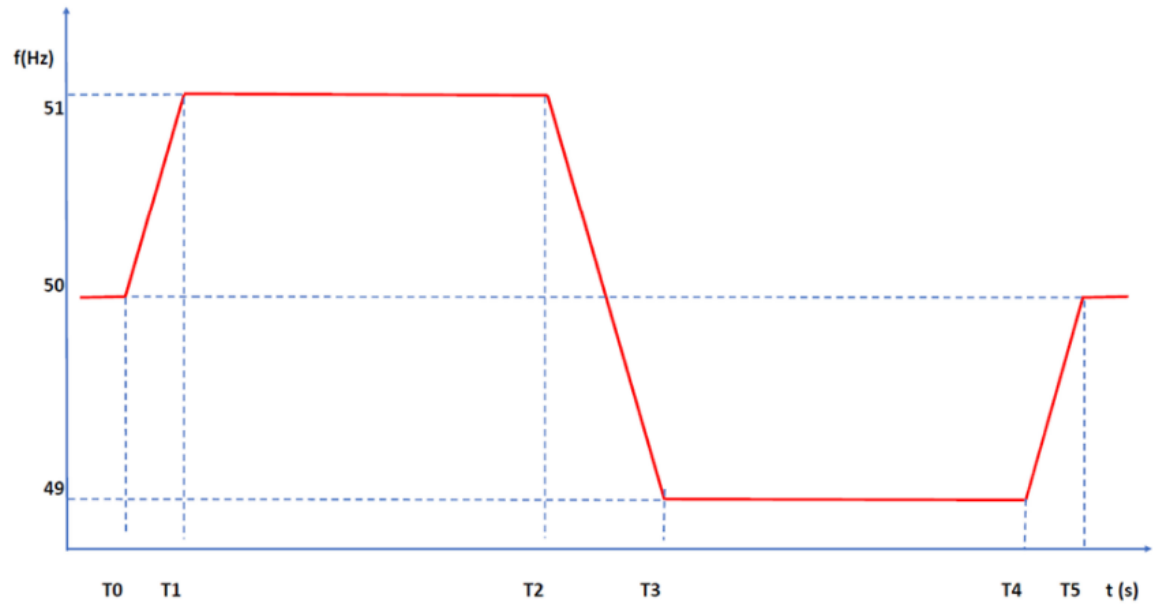
Note(s):

☒ Non-synchronous generating technology: at least 2 Hz/s

☐ Synchronous generating technology: at least 1 Hz/s

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

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



5.3.2	TABLE: Phase jump							P
Test Condition		Measurements			Limitation			
		After phase jump ride through			After phase jump ride through			
P/Pn	Phase displacement [°]	Result	P/Pn	$T_{an_90\%}$ [s]	Result	P/Pn	$T_{an_90\%}$ [s]	
100%	+90°	No damage, inverter connected	100.32%	0.3	No damage inverter connected	≥ 90%	≤ 1 s	
100%	-90°	No damage, inverter connected	99.71%	0.2				
100%	+180°	No damage, inverter connected	100.66%	0.3				
100%	-180°	No damage, inverter connected	100.66%	0.3				
100%	+50°	No damage, inverter connected	100.31%	0.2				
100%	-50°	No damage, inverter connected	100.56%	0.2				
Note: Before phase jump ride through, the test the EUT is operating to Un, more than 90%, and active factor (cosφ) =1 at least for 5 min.								

5.3.3	TABLE: Immunity to disturbances - Fault ride through, over-voltage (OVRT) and under-voltage (UVRT)	P

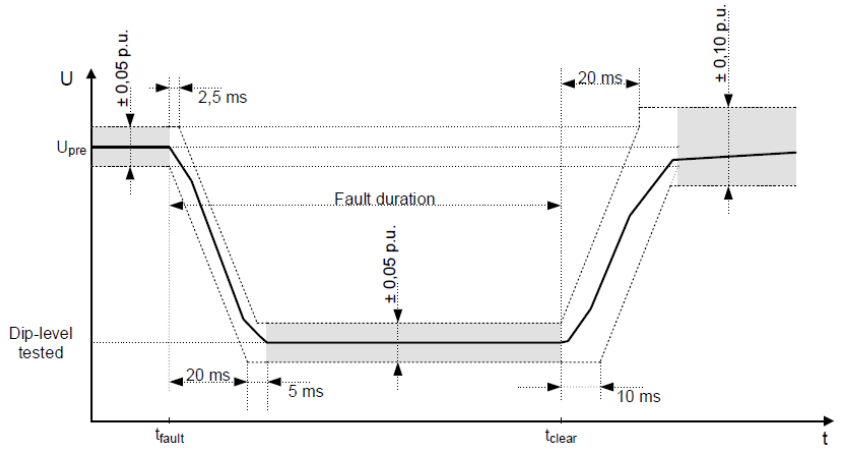


Figure 5 — Tolerances of the positive sequence voltage for the undervoltage event

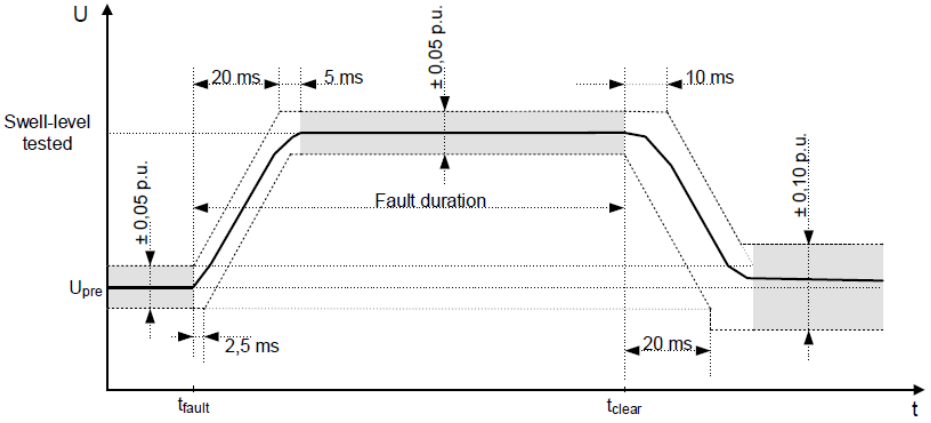


Figure 6 — Tolerances of the positive sequence voltage for the overvoltage event

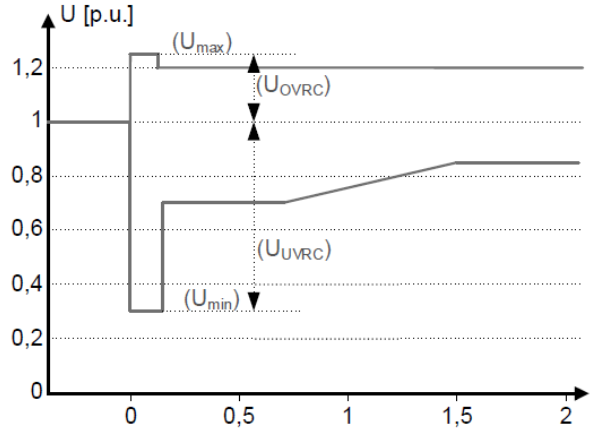


Figure 7 — U_{UVRC} and U_{OVRC} for the default requirement of a generating plant of synchronous generating technology

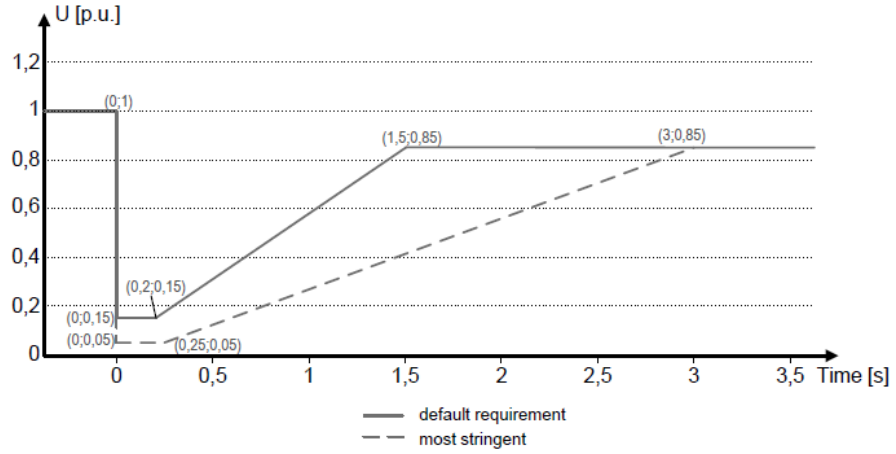


Figure 6 — Under-voltage ride through capability for non-synchronous generating technology (EN 50549-1)

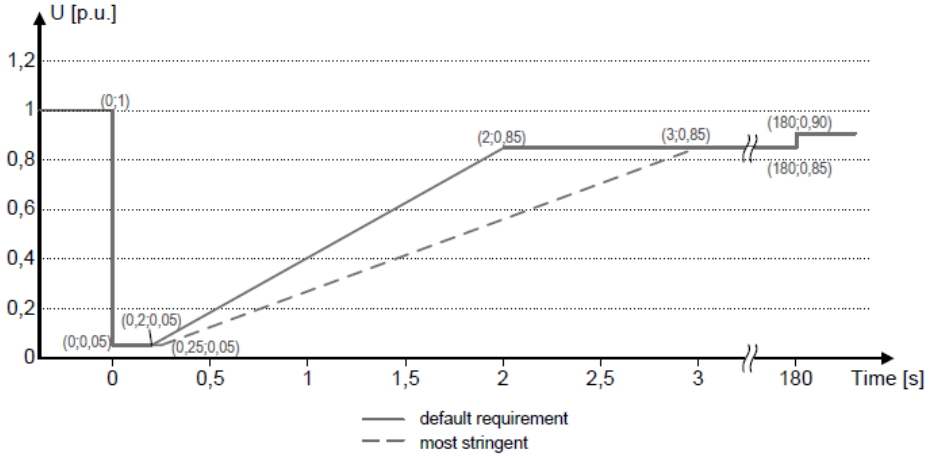


Figure 6 — Under-voltage ride through capability for non-synchronous generating technology (EN 50549-2)

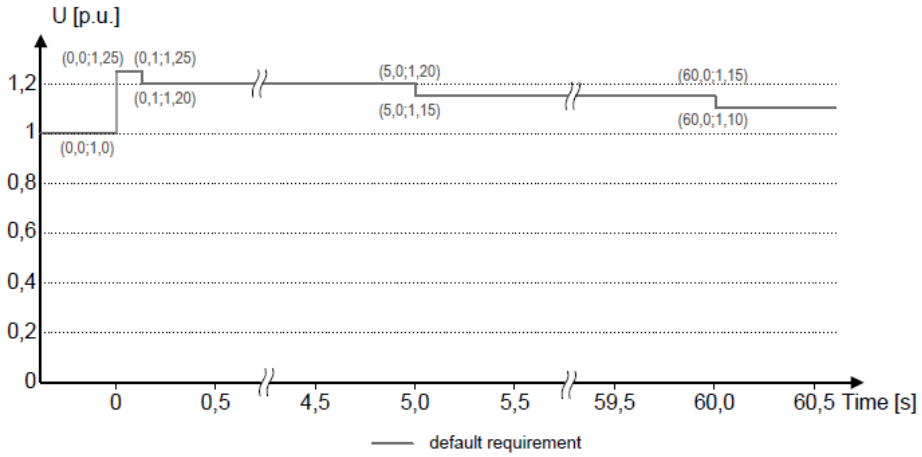


Figure 8 — Over-voltage ride through capability (EN 50549-1, EN 50549-2)

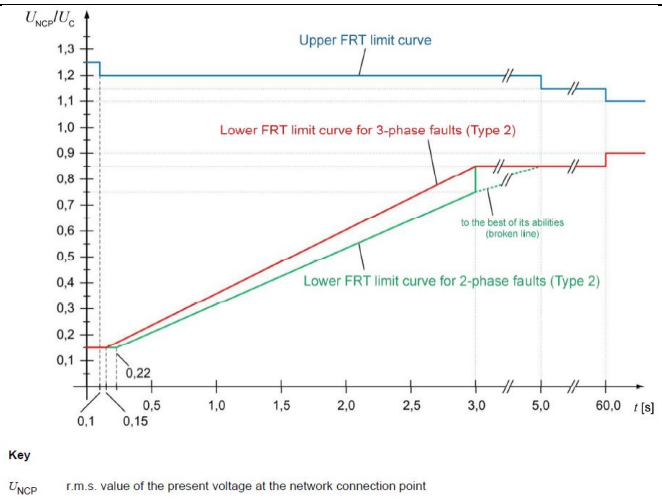


Figure 14 – Fault Ride-Through (FRT) limit curve for the voltage curve at the network connection point for a Type 2 power generating plant (VDE-AR-N 4110)

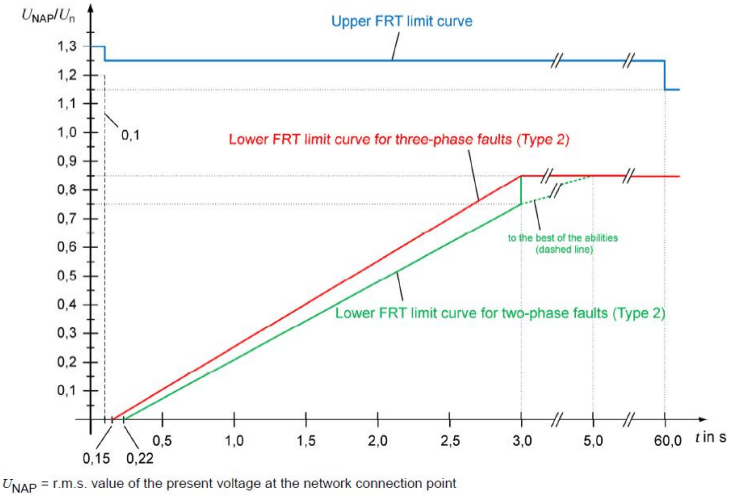


Figure 12 – Fault Ride-Through (FRT) limit curve for the voltage curve at the network connection point for a Type 2 power generating plant (VDE-AR-N 4110)

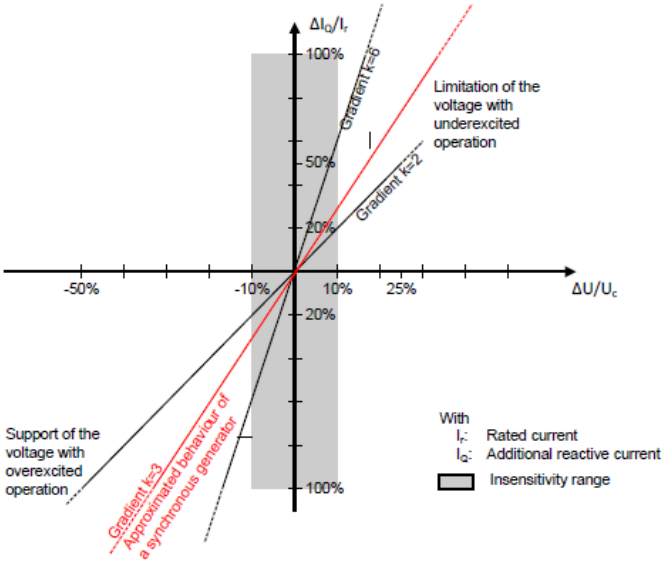


Figure 17 — Principle of voltage support during faults and voltage steps (EN 50549-2)

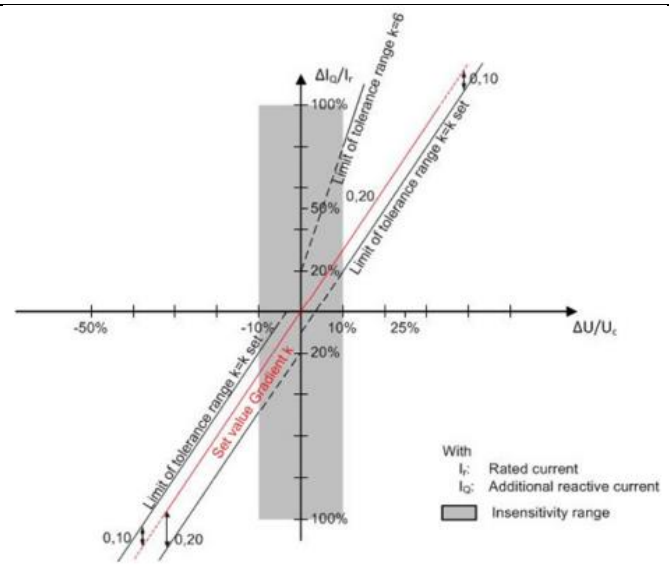


Figure 18 — Accuracy requirement for additional reactive current in positive and negative sequence

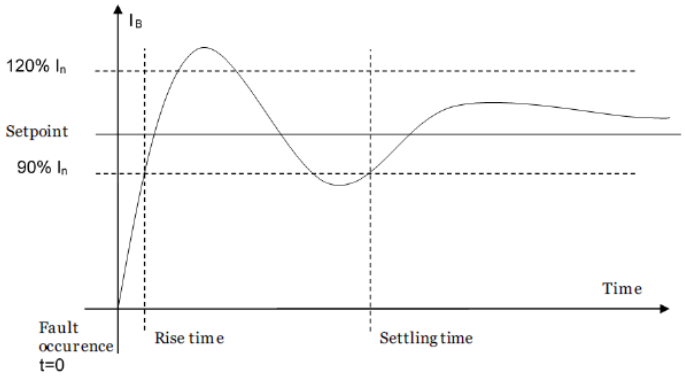


Fig. 4-30: Determination of the rise and settling times for setpoint value I_Q = 100% In (BDEW TG3)

U ≤ 15%U_c, No current supply is required. T_{sr} ≤ 30ms; T_s ≤ 60ms; $T_{an_90\%}$ ≤ 1s

I ≤ 10% I_n during FRT for Zero current mode

$|I_{Q1}| + |I_{Q2}| \geq I_n$

I_{Q1} – Positive sequence reactive current

I_{Q1} – Negative sequence reactive current

I_n – Rated current of the PGU

Test condition:

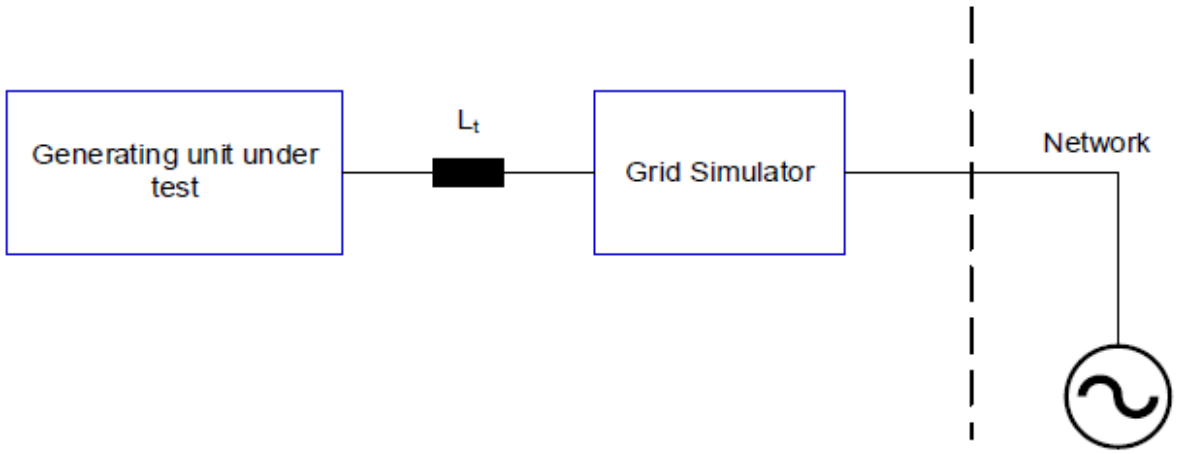


Figure A.3 — Example test setup with AC grid simulator

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

FRT fault type A and D	Test equipment (AC grid simulator)	Test sample
Connection terminal	U	L1
	V	L2
	W	**L3 (L for single phase)**

Regarding phase relationship in the test event:

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

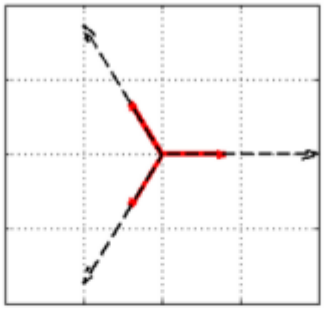


Figure A.4 — Vectorial representation of a symmetrical three-phase fault

2) asymmetric two-phase fault (Table 3, Tests VD 6, 7, 8, 9, 10), see Figure A.5.

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

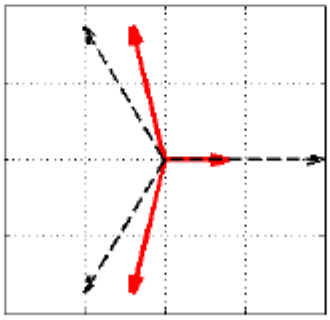


Figure A.5 — vectorial representation of an asymmetric two-phase fault

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

Table A.1 — Phase vectors on the LV side of a Dy transformer in the presence of asymmetric two-phase fault on the primary MV side

	U/U_n (MV side)	Phase-earth voltages (LV side)			Phase angles		
		$U_1 / U_{1,n}$	$U_2 / U_{2,n}$	$U_3 / U_{3,n}$	φ_{U1}	φ_{U2}	φ_{U3}
VD6	0.05 ±0.05	0.05 ±0.05	0.87 ±0.05	0.87 ±0.05	0°	268°	92°
VD7	0.25 ±0.05	0.25 ±0.05	0.88 ±0.05	0.88 ±0.05	0°	262°	98°
VD8	0.50 ±0.05	0.50 ±0.05	0.90 ±0.05	0.90 ±0.05	0°	254°	106°
VD9	0.75 ±0.05	0.75 ±0.05	0.94 ±0.05	0.94 ±0.05	0°	247°	113°
VD10	0.90 ±0.05	0.90 ±0.05	0.98 ±0.05	0.98 ±0.05	0°	243°	117°
normal conditions	1	1	1	1	0°	240°	120°

Table A.2 — Phase vectors on the LV side of a Dy transformer in the presence of asymmetric two-phase overvoltage event on the primary MV side

	U/U_n (MV side)	Phase-earth voltages (LV side)			Phase angles		
		$U_1 / U_{1,n}$	$U_2 / U_{2,n}$	$U_3 / U_{3,n}$	φ_{U1}	φ_{U2}	φ_{U3}
VS3	1.25 ±0.05	1.25 ±0.05	1.07 ±0.05	1.07 ±0.05	0°	234°	126°
VS4.1	1.20 ±0.05	1.20 ±0.05	1.05 ±0.05	1.05 ±0.05	0°	235°	125°
VS4.2	1.15 ±0.05	1.15 ±0.05	1.04 ±0.05	1.04 ±0.05	0°	236°	124°
normal conditions	1	1	1	1	0°	240°	120°

Note(s):

FRT Fault for Type A: Three phase symmetrical fault

FRT Fault for Type D: Two phase asymmetrical fault

5.3.3	TABLE: Immunity to disturbances - Fault ride through, over-voltage (OVRT) and under-voltage (UVRT)	P

DC Input:757V

	No.	Parameter	Phase ref.	Time ref.	unit	1.1	1.2	1.3	1.4	2.1
General Info.	1	Test number	--	--	--	1.1	1.2	1.3	1.4	2.1
	2	Date	--	--	dd.mm.yyyy	4.3.2025	4.3.2025	28.3.2025	28.3.2025	4.3.2025
	3	Time	--	--	hh:mm:ss.f	4:11:45 PM	4:12:18 PM	5:09:12 PM	5:09:52 PM	4:39:58 PM
	4	Type of fault	--	--	--	3-phase fault	3-phase fault	2-phase fault	2-phase fault	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.02	0.02	0.03	0.03	
	6	Drop duration setpoint	--	--	ms	262	262	261	263	921
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	261	261	260	262	921

	No.	Parameter	Phase ref.	Time ref.	unit	1.1	1.2	1.3	1.4	2.1
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	15	Fault duration determined from test	--	--	ms	261	261	260	262	921
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.03	0.03	0.03	0.03	0.22
	17		pos			0.04	0.04	0.53	0.53	0.22
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.00	1.00	1.00	1.00	1.00
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	1.00	1.00	1.00
	25		pos	t1-1s to t1	p.u.	1.00	1.00	1.00	1.00	1.00
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	1.00	0.21	1.01	0.21	1.00
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	1.00	0.21	1.01	0.21	1.00

	No.	Parameter	Phase ref.	Time ref.	unit	1.1	1.2	1.3	1.4	2.1
	32	Active power	total	t1-10s to t1	p.u.	1.00	0.21	1.01	0.21	1.01
	33		total	t1-2s to t1	p.u.	1.00	0.21	1.01	0.21	1.01
	34		pos	t1-500ms to t1-100ms	p.u.	1.00	0.21	1.01	0.21	1.00
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.02	1.05	1.01	1.02	1.23
	38		neg	--	--	N/A	N/A	1.03	1.03	N/A
	39	Reactive current settling up time	pos	--	ms	20	50	28	29	50
	40		neg	--	ms	N/A	N/A	21	28	N/A
	41	Reactive current settling time	pos	--	ms	48	50	28	29	50
	42		neg	--	ms	N/A	N/A	21	28	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.04	0.04	0.53	0.53	0.22
	44		neg	t1+100ms to t2-20ms	p.u.	0.00	0.00	0.48	0.48	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.99	1.01	0.48	0.49	0.97
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	0.00	-0.49	-0.49	0.00
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	1.06	1.07	0.49	0.49	0.97
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.00	0.49	0.49	0.00
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.01	0.01	0.27	0.27	0.00

	No.	Parameter	Phase ref.	Time ref.	unit	1.1	1.2	1.3	1.4	2.1
	50		pos	t1+100ms to t2-20ms	p.u.	0.01	0.01	0.02	0.02	0.00
	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	653.01	273.09	N/A	N/A	628.57
	52		phase2	t1 to t1+20ms	A	732.26	338.75	N/A	N/A	815.65
	53		phase3	t1 to t1+20ms	A	673.33	296.20	N/A	N/A	664.27
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	1.28	0.50	N/A	N/A	1.16
	55		phase 2	t1+20ms	p.u.	1.11	0.39	N/A	N/A	1.07
	56		phase 3	t1+20ms	p.u.	1.05	0.48	N/A	N/A	1.06
	57		phase 1	t1+100ms	p.u.	1.05	1.07	N/A	N/A	0.96
	58		phase 2	t1+100ms	p.u.	1.06	1.08	N/A	N/A	0.97
	59		phase 3	t1+100ms	p.u.	1.05	1.08	N/A	N/A	0.97
	60		phase 1	t1+150ms	p.u.	1.05	1.07	N/A	N/A	0.97
	61		phase 2	t1+150ms	p.u.	1.05	1.07	N/A	N/A	0.97
	62		phase 3	t1+150ms	p.u.	1.05	1.07	N/A	N/A	0.97
	63		phase 1	t1+300ms	p.u.	0.67	0.19	N/A	N/A	0.97
	64		phase 2	t1+300ms	p.u.	0.67	0.19	N/A	N/A	0.97
	65		phase 3	t1+300ms	p.u.	0.67	0.19	N/A	N/A	0.97
	66		phase 1	t1+500ms	p.u.	1.00	0.21	N/A	N/A	0.96
	67		phase 2	t1+500ms	p.u.	1.00	0.21	N/A	N/A	0.96
	68		phase 3	t1+500ms	p.u.	1.00	0.21	N/A	N/A	0.96
	69		phase 1	t1+1000ms	p.u.	0.98	0.21	N/A	N/A	1.02
	70		phase 2	t1+1000ms	p.u.	0.98	0.21	N/A	N/A	1.02

	No.	Parameter	Phase ref.	Time ref.	unit	1.1	1.2	1.3	1.4	2.1
	71		phase 3	t1+1000ms	p.u.	0.98	0.21	N/A	N/A	1.02
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	1.00	0.21	1.01	0.21	1.01
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.048	0.042	0.031	0.033	0.05

	No.	Parameter	Phase ref.	Time ref.	unit	2.2	2.3	2.4	2.5	2.6
General Info.	1	Test number	--	--	--	2.2	2.3	2.4	2.5	2.6
	2	Date	--	--	dd.mm.yyyy	4.3.2025	28.3.2025	28.3.2025	4.3.2025	4.3.2025
	3	Time	--	--	hh:mm:ss.f	4:40:37 PM	5:10:28 PM	5:11:11 PM	4:44:34 PM	4:45:15 PM
	4	Type of fault	--	--	--	3-phase fault	2-phase fault	2-phase fault	3-phase fault	2-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.		0.21	0.21		0.20
	6	Drop duration setpoint	--	--	ms	923	923	922	923	923
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	920	922	921	921	922
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	2.2	2.3	2.4	2.5	2.6
	15	Fault duration determined from test	--	--	ms	920	922	921	921	922
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.22	0.21	0.21	0.20	0.20
	17		pos			0.22	0.62	0.62	0.20	0.61
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.00	1.00	1.00	1.00	1.00
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	1.00	1.00	1.00
	25		pos	t1-1s to t1	p.u.	1.00	1.00	1.00	1.00	1.00
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.21	1.01	0.21	1.00	1.00
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00

	No.	Parameter	Phase ref.	Time ref.	unit	2.2	2.3	2.4	2.5	2.6
	31	Active current	pos	t1-1s to t1	p.u.	0.21	1.01	0.21	1.00	1.00
	32	Active power	total	t1-10s to t1	p.u.	0.21	1.01	0.21	1.00	1.00
	33		total	t1-2s to t1	p.u.	0.21	1.01	0.21	1.00	1.00
	34		pos	t1-500ms to t1-100ms	p.u.	0.21	1.01	0.21	1.00	1.00
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.23	1.27	1.27	N/A	N/A
	38		neg	--	--	N/A	1.28	1.29	N/A	N/A
	39	Reactive current settling up time	pos	--	ms	45	30	28	N/A	N/A
	40		neg	--	ms	N/A	29	28	N/A	N/A
	41	Reactive current settling time	pos	--	ms	45	30	28	N/A	N/A
	42		neg	--	ms	N/A	29	28	N/A	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.22	0.62	0.62	0.20	0.61
	44		neg	t1+100ms to t2-20ms	p.u.	0.00	0.39	0.39	0.00	0.40
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.97	0.49	0.49	-0.03	-0.01
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	-0.49	-0.49	0.00	0.02
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.97	0.49	0.49	0.04	0.02
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.49	0.50	0.00	0.02

	No.	Parameter	Phase ref.	Time ref.	unit	2.2	2.3	2.4	2.5	2.6
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.00	0.27	0.27	0.00	0.01
	50		pos	t1+100ms to t2-20ms	p.u.	0.00	0.01	0.01	0.00	0.01
	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	230.01	N/A	N/A	638.81	N/A
	52		phase2	t1 to t1+20ms	A	323.60	N/A	N/A	781.80	N/A
	53		phase3	t1 to t1+20ms	A	261.25	N/A	N/A	653.53	N/A
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.44	N/A	N/A	1.01	N/A
	55		phase 2	t1+20ms	p.u.	0.31	N/A	N/A	0.98	N/A
	56		phase 3	t1+20ms	p.u.	0.38	N/A	N/A	0.81	N/A
	57		phase 1	t1+100ms	p.u.	0.96	N/A	N/A	0.04	N/A
	58		phase 2	t1+100ms	p.u.	0.97	N/A	N/A	0.04	N/A
	59		phase 3	t1+100ms	p.u.	0.96	N/A	N/A	0.03	N/A
	60		phase 1	t1+150ms	p.u.	0.97	N/A	N/A	0.04	N/A
	61		phase 2	t1+150ms	p.u.	0.97	N/A	N/A	0.04	N/A
	62		phase 3	t1+150ms	p.u.	0.97	N/A	N/A	0.04	N/A
	63		phase 1	t1+300ms	p.u.	0.97	N/A	N/A	0.04	N/A
	64		phase 2	t1+300ms	p.u.	0.97	N/A	N/A	0.04	N/A
	65		phase 3	t1+300ms	p.u.	0.97	N/A	N/A	0.04	N/A
	66		phase 1	t1+500ms	p.u.	0.97	N/A	N/A	0.04	N/A
	67		phase 2	t1+500ms	p.u.	0.97	N/A	N/A	0.04	N/A
	68		phase 3	t1+500ms	p.u.	0.97	N/A	N/A	0.04	N/A
	69		phase 1	t1+1000ms	p.u.	0.21	N/A	N/A	1.00	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	2.2	2.3	2.4	2.5	2.6
	70		phase 2	t1+1000ms	p.u.	0.21	N/A	N/A	1.00	N/A
	71		phase 3	t1+1000ms	p.u.	0.21	N/A	N/A	1.00	N/A
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.21	1.01	0.21	1.00	1.00
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.044	0.028	0.035	0.049	0.049

	No.	Parameter	Phase ref.	Time ref.	unit	3.1	3.2	3.3	3.4	4.1
General Info.	1	Test number	--	--	--	3.1	3.2	3.3	3.4	4.1
	2	Date	--	--	dd.mm.yyyy	4.3.2025	4.3.2025	28.3.2025	28.3.2025	4.3.2025
	3	Time	--	--	hh:mm:ss.f	4:45:55 PM	4:46:35 PM	5:15:08 PM	5:15:59 PM	4:48:38 PM
	4	Type of fault	--	--	--	3-phase fault	3-phase fault	2-phase fault	2-phase fault	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.50	0.50	0.52	0.52	0.75
	6	Drop duration setpoint	--	--	ms	1881	1881	1883	1883	2701
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	1881	1881	1882	1882	2701
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	3.1	3.2	3.3	3.4	4.1
	15	Fault duration determined from test	--	--	ms	1881	1881	1882	1882	2701
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.52	0.52	0.52	0.52	0.76
	17		pos			0.52	0.52	0.76	0.76	0.76
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.00	1.00	1.00	1.00	1.00
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	1.00	1.00	1.00
	25		pos	t1-1s to t1	p.u.	1.00	1.00	1.00	1.00	1.00
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	1.00	0.21	1.00	0.21	1.00
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	1.00	0.21	1.00	0.21	1.00
	32	Active power	total	t1-10s to t1	p.u.	1.01	0.21	1.00	0.21	1.00
	33		total	t1-2s to t1	p.u.	1.01	0.21	1.00	0.21	1.00

	No.	Parameter	Phase ref.	Time ref.	unit	3.1	3.2	3.3	3.4	4.1
	34		pos	t1-500ms to t1-100ms	p.u.	1.01	0.21	1.00	0.21	1.00
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.95	1.96	1.98	2.00	1.96
	38		neg	--	--	N/A	N/A	1.99	2.00	N/A
	39	Reactive current settling up time	pos	--	ms	48	44	38	39	49
	40		neg	--	ms	N/A	N/A	39	39	N/A
	41	Reactive current settling time	pos	--	ms	48	44	38	39	49
	42		neg	--	ms	N/A	N/A	39	39	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.52	0.52	0.76	0.76	0.76
	44		neg	t1+100ms to t2-20ms	p.u.	0.00	0.00	0.24	0.24	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.95	0.95	0.49	0.49	0.48
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	0.00	-0.48	-0.48	0.00
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.95	0.95	0.49	0.49	0.48
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.00	0.48	0.48	0.00
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.01	0.01	0.26	0.26	0.02
	50		pos	t1+100ms to t2-20ms	p.u.	0.01	0.01	0.01	0.02	0.02
	51	Short-circuit	phase1	t1 to	A	602.21	208.48	N/A	N/A	569.04

	No.	Parameter	Phase ref.	Time ref.	unit	3.1	3.2	3.3	3.4	4.1
		currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion		t1+20ms						
	52		phase2	t1 to t1+20ms	A	702.99	234.21	N/A	N/A	602.27
	53		phase3	t1 to t1+20ms	A	582.09	218.11	N/A	N/A	552.90
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	1.09	0.35	N/A	N/A	1.04
	55		phase 2	t1+20ms	p.u.	1.00	0.26	N/A	N/A	0.99
	56		phase 3	t1+20ms	p.u.	0.98	0.30	N/A	N/A	0.97
	57		phase 1	t1+100ms	p.u.	0.95	0.94	N/A	N/A	0.49
	58		phase 2	t1+100ms	p.u.	0.95	0.95	N/A	N/A	0.48
	59		phase 3	t1+100ms	p.u.	0.95	0.95	N/A	N/A	0.49
	60		phase 1	t1+150ms	p.u.	0.95	0.94	N/A	N/A	0.48
	61		phase 2	t1+150ms	p.u.	0.95	0.94	N/A	N/A	0.48
	62		phase 3	t1+150ms	p.u.	0.95	0.94	N/A	N/A	0.48
	63		phase 1	t1+300ms	p.u.	0.94	0.95	N/A	N/A	0.47
	64		phase 2	t1+300ms	p.u.	0.94	0.95	N/A	N/A	0.47
	65		phase 3	t1+300ms	p.u.	0.94	0.95	N/A	N/A	0.47
	66		phase 1	t1+500ms	p.u.	0.95	0.94	N/A	N/A	0.49
	67		phase 2	t1+500ms	p.u.	0.95	0.94	N/A	N/A	0.49
	68		phase 3	t1+500ms	p.u.	0.95	0.94	N/A	N/A	0.49
	69		phase 1	t1+1000ms	p.u.	0.94	0.94	N/A	N/A	0.49
	70		phase 2	t1+1000ms	p.u.	0.94	0.94	N/A	N/A	0.49
	71		phase 3	t1+1000ms	p.u.	0.94	0.94	N/A	N/A	0.49
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	1.01	0.21	1.00	0.21	1.01

	No.	Parameter	Phase ref.	Time ref.	unit	3.1	3.2	3.3	3.4	4.1
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.05	0.043	0.027	0.03	0.05

	No.	Parameter	Phase ref.	Time ref.	unit	4.2	4.3	4.4	4.5	4.6
General Info.	1	Test number	--	--	--	4.2	4.3	4.4	4.5	4.6
	2	Date	--	--	dd.mm.yyyy	4.3.2025	28.3.2025	28.3.2025	4.3.2025	17.3.2025
	3	Time	--	--	hh:mm:ss.f	4:49:10 PM	5:16:48 PM	5:17:32 PM	4:51:03 PM	2:20:43 PM
	4	Type of fault	--	--	--	3-phase fault	2-phase fault	2-phase fault	3-phase fault	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.75	0.76	0.76	0.75	0.76
	6	Drop duration setpoint	--	--	ms	2701	2702	2702	2701	2702
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	2701	2701	2701	2701	2701
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	15	Fault duration	--	--	ms	2701	2701	2701	2701	2701

	No.	Parameter	Phase ref.	Time ref.	unit	4.2	4.3	4.4	4.5	4.6
		determined from test								
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.76	0.76	0.76	0.75	0.76
	17		pos			0.76	0.88	0.88	0.75	0.77
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.00	1.00	1.00	1.00	1.01
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	1.00	1.00	1.01
	25		pos	t1-1s to t1	p.u.	1.00	1.00	1.00	1.00	1.01
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.20	1.00	0.21	0.37	0.37
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	-0.31	0.31
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	-0.31	0.31
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	0.21	1.00	0.21	0.20	0.21
	32	Active power	total	t1-10s to t1	p.u.	0.21	1.00	0.21	0.20	0.21
	33		total	t1-2s to t1	p.u.	0.21	1.00	0.21	0.20	0.21
	34		pos	t1-500ms to	p.u.	0.21	1.00	0.21	0.20	0.21

	No.	Parameter	Phase ref.	Time ref.	unit	4.2	4.3	4.4	4.5	4.6
				t1-100ms						
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.98	2.02	2.06	1.60	2.33
	38		neg	--	--	N/A	1.98	2.00	N/A	N/A
	39	Reactive current settling up time	pos	--	ms	44	39	37	37	67
	40		neg	--	ms	N/A	45	39	N/A	N/A
	41	Reactive current settling time	pos	--	ms	44	39	37	37	67
	42		neg	--	ms	N/A	45	39	N/A	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.76	0.88	0.88	0.75	0.77
	44		neg	t1+100ms to t2-20ms	p.u.	0.00	0.12	0.12	0.00	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.48	0.26	0.26	0.08	0.87
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	-0.24	-0.24	0.00	0.00
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.48	0.26	0.26	0.08	0.87
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.24	0.24	0.00	0.00
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.02	0.13	0.13	0.01	0.02
	50		pos	t1+100ms to t2-20ms	p.u.	0.02	0.02	0.02	0.01	0.02
	51	Short-circuit currents, only for	phase1	t1 to t1+20ms	A	181.95	N/A	N/A	242.00	309.87

	No.	Parameter	Phase ref.	Time ref.	unit	4.2	4.3	4.4	4.5	4.6
	52	3-phase fault Highes instantaneous values of current including any decaying DC current portion	phase2	t1 to t1+20ms	A	204.94	N/A	N/A	196.60	275.86
	53		phase3	t1 to t1+20ms	A	160.24	N/A	N/A	204.84	253.90
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.27	N/A	N/A	0.28	0.39
	55		phase 2	t1+20ms	p.u.	0.23	N/A	N/A	0.24	0.40
	56		phase 3	t1+20ms	p.u.	0.25	N/A	N/A	0.29	0.31
	57		phase 1	t1+100ms	p.u.	0.49	N/A	N/A	0.12	0.84
	58		phase 2	t1+100ms	p.u.	0.48	N/A	N/A	0.11	0.85
	59		phase 3	t1+100ms	p.u.	0.49	N/A	N/A	0.11	0.84
	60		phase 1	t1+150ms	p.u.	0.48	N/A	N/A	0.10	0.86
	61		phase 2	t1+150ms	p.u.	0.48	N/A	N/A	0.10	0.86
	62		phase 3	t1+150ms	p.u.	0.48	N/A	N/A	0.10	0.86
	63		phase 1	t1+300ms	p.u.	0.48	N/A	N/A	0.08	0.87
	64		phase 2	t1+300ms	p.u.	0.48	N/A	N/A	0.08	0.87
	65		phase 3	t1+300ms	p.u.	0.48	N/A	N/A	0.08	0.87
	66		phase 1	t1+500ms	p.u.	0.48	N/A	N/A	0.08	0.87
	67		phase 2	t1+500ms	p.u.	0.48	N/A	N/A	0.08	0.87
	68		phase 3	t1+500ms	p.u.	0.48	N/A	N/A	0.08	0.87
	69		phase 1	t1+1000ms	p.u.	0.48	N/A	N/A	0.08	0.87
	70		phase 2	t1+1000ms	p.u.	0.48	N/A	N/A	0.08	0.87
	71		phase 3	t1+1000ms	p.u.	0.48	N/A	N/A	0.08	0.87
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.21	1.00	0.21	0.20	0.21

	No.	Parameter	Phase ref.	Time ref.	unit	4.2	4.3	4.4	4.5	4.6
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.046	0.026	0.026	0.561	0.047

	No.	Parameter	Phase ref.	Time ref.	unit	4.7	4.8	4.9	410	5.1
General Info.	1	Test number	--	--	--	4.7	4.8	4.9	4.10	5.1
	2	Date	--	--	dd.mm.yyyy	4.3.2025	17.3.2025	4.3.2025	4.10	4.3.2025
	3	Time	--	--	hh:mm:ss.f	4:54:08 PM	2:21:28 PM	4:55:39 PM	4.3.2025	4:57:12 PM
	4	Type of fault	--	--	--	3-phase fault	2-phase fault	3-phase fault	4:56:13 PM	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.75	0.77	0.75	2-phase fault	0.88
	6	Drop duration setpoint	--	--	ms	2701	2702	2701	0.75	60021
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	3021	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	N/A	0
	13	Fault clearance (t2)	--	--	ms	2701	2701	2681	0	60020
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	3020	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	4.7	4.8	4.9	410	5.1
	15	Fault duration determined from test	--	--	ms	2701	2701	2681	N/A	60020
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.77	0.77	0.75	3020	0.88
	17		pos			0.77	0.88	0.75	0.75	0.88
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	0.87	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.00	1.00	1.00	N/A	1.01
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	1.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	1.00	0.00	1.01
	25		pos	t1-1s to t1	p.u.	1.00	1.00	1.00	1.00	1.01
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	1.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.21	0.21	1.00	0.00	1.00
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	1.00	0.00
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	0.20	0.21	1.00	0.00	1.00
	32	Active power	total	t1-10s to t1	p.u.	0.20	0.21	1.00	1.00	1.01
	33		total	t1-2s to t1	p.u.	0.20	0.21	1.00	1.00	1.01

	No.	Parameter	Phase ref.	Time ref.	unit	4.7	4.8	4.9	410	5.1
	34		pos	t1-500ms to t1-100ms	p.u.	0.21	0.21	1.00	1.00	1.01
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	1.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	0.00	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	4.30	4.09	N/A	N/A	2.00
	38		neg	--	--	N/A	3.90	N/A	N/A	N/A
	39	Reactive current settling up time	pos	--	ms	45	41	N/A	N/A	49
	40		neg	--	ms	N/A	59	N/A	N/A	N/A
	41	Reactive current settling time	pos	--	ms	45	41	N/A	N/A	49
	42		neg	--	ms	N/A	59	N/A	N/A	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.77	0.88	0.75	N/A	0.88
	44		neg	t1+100ms to t2-20ms	p.u.	0.00	0.11	0.00	0.87	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	1.00	0.49	-0.01	0.13	0.24
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	-0.44	0.00	0.00	0.00
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	1.00	0.49	0.02	0.01	0.24
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.44	0.00	0.02	0.00
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.02	0.25	0.01	0.01	0.02
	50		pos	t1+100ms to t2-20ms	p.u.	0.02	0.02	0.01	0.02	0.02
	51	Short-circuit	phase1	t1 to	A	159.93	N/A	559.83	0.02	538.53

	No.	Parameter	Phase ref.	Time ref.	unit	4.7	4.8	4.9	410	5.1
		currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion		t1+20ms						
	52		phase2	t1 to t1+20ms	A	196.65	N/A	596.33	N/A	566.89
	53		phase3	t1 to t1+20ms	A	161.46	N/A	555.94	N/A	546.87
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.28	N/A	0.91	N/A	0.93
	55		phase 2	t1+20ms	p.u.	0.22	N/A	0.86	N/A	0.84
	56		phase 3	t1+20ms	p.u.	0.25	N/A	0.70	N/A	0.71
	57		phase 1	t1+100ms	p.u.	1.00	N/A	0.01	N/A	0.25
	58		phase 2	t1+100ms	p.u.	1.00	N/A	0.02	N/A	0.24
	59		phase 3	t1+100ms	p.u.	0.99	N/A	0.01	N/A	0.25
	60		phase 1	t1+150ms	p.u.	1.00	N/A	0.02	N/A	0.24
	61		phase 2	t1+150ms	p.u.	1.00	N/A	0.02	N/A	0.24
	62		phase 3	t1+150ms	p.u.	1.00	N/A	0.02	N/A	0.24
	63		phase 1	t1+300ms	p.u.	1.00	N/A	0.02	N/A	0.24
	64		phase 2	t1+300ms	p.u.	1.00	N/A	0.02	N/A	0.24
	65		phase 3	t1+300ms	p.u.	1.00	N/A	0.02	N/A	0.24
	66		phase 1	t1+500ms	p.u.	1.00	N/A	0.02	N/A	0.24
	67		phase 2	t1+500ms	p.u.	1.00	N/A	0.02	N/A	0.24
	68		phase 3	t1+500ms	p.u.	1.00	N/A	0.02	N/A	0.24
	69		phase 1	t1+1000ms	p.u.	1.00	N/A	0.02	N/A	0.24
	70		phase 2	t1+1000ms	p.u.	1.00	N/A	0.02	N/A	0.24
	71		phase 3	t1+1000ms	p.u.	1.00	N/A	0.02	N/A	0.24
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.20	0.21	1.00	N/A	1.01

	No.	Parameter	Phase ref.	Time ref.	unit	4.7	4.8	4.9	410	5.1
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	1.00	N/A
	74	Active current rise time	pos	--	s	0.041	0.04	0.045	N/A	0.044

	No.	Parameter	Phase ref.	Time ref.	unit	5.2	5.3	5.4	5.5	6.1
General Info.	1	Test number	--	--	--	5.2	5.3	5.4	5.5	6.1
	2	Date	--	--	dd.mm.yyyy	4.3.2025	28.3.2025	28.3.2025	4.3.2025	4.3.2025
	3	Time	--	--	hh:mm:ss.f	4:58:18 PM	5:18:58 PM	5:19:57 PM	5:00:42 PM	5:02:18 PM
	4	Type of fault	--	--	--	3-phase fault	2-phase fault	2-phase fault	3-phase fault	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.88	0.88	0.88	0.88	
	6	Drop duration setpoint	--	--	ms	60021	60021	60021	60021	60021
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	60020	60020	60020	60020	60021
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	5.2	5.3	5.4	5.5	6.1
	15	Fault duration determined from test	--	--	ms	60020	60020	60020	60020	60021
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.88	0.88	0.88	0.89	1.15
	17		pos			0.88	0.95	0.95	0.89	1.15
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.00	1.00	1.00	1.00	1.00
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	1.00	1.00	1.00
	25		pos	t1-1s to t1	p.u.	1.00	1.00	1.00	1.00	1.00
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.21	1.00	0.21	0.20	1.00
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	0.21	1.00	0.21	0.20	1.00
	32	Active power	total	t1-10s to t1	p.u.	0.21	1.00	0.21	0.21	1.01
	33		total	t1-2s to t1	p.u.	0.21	1.00	0.21	0.21	1.01

	No.	Parameter	Phase ref.	Time ref.	unit	5.2	5.3	5.4	5.5	6.1
	34		pos	t1-500ms to t1-100ms	p.u.	0.21	1.00	0.21	0.20	1.01
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	2.03	2.12	2.20	5.14	1.88
	38		neg	--	--	N/A	1.99	2.00	N/A	N/A
	39	Reactive current settling up time	pos	--	ms	47	38	35	41	50
	40		neg	--	ms	N/A	10	45	N/A	N/A
	41	Reactive current settling time	pos	--	ms	47	38	35	41	50
	42		neg	--	ms	N/A	17	45	N/A	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.88	0.95	0.95	0.89	1.15
	44		neg	t1+100ms to t2-20ms	p.u.	0.00	0.06	0.06	0.00	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.24	0.12	0.12	0.57	-0.27
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	-0.12	-0.12	0.00	0.00
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.24	0.12	0.12	0.57	0.27
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.12	0.12	0.00	0.00
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.02	0.08	0.08	0.02	0.02
	50		pos	t1+100ms to t2-20ms	p.u.	0.02	0.02	0.02	0.02	0.02
	51	Short-circuit	phase1	t1 to	A	146.77	N/A	N/A	177.79	508.55

	No.	Parameter	Phase ref.	Time ref.	unit	5.2	5.3	5.4	5.5	6.1
		currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion		t1+20ms						
	52		phase2	t1 to t1+20ms	A	158.94	N/A	N/A	148.79	489.03
	53		phase3	t1 to t1+20ms	A	132.47	N/A	N/A	158.48	354.64
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.21	N/A	N/A	0.24	0.44
	55		phase 2	t1+20ms	p.u.	0.20	N/A	N/A	0.19	0.36
	56		phase 3	t1+20ms	p.u.	0.17	N/A	N/A	0.18	0.26
	57		phase 1	t1+100ms	p.u.	0.25	N/A	N/A	0.58	0.25
	58		phase 2	t1+100ms	p.u.	0.24	N/A	N/A	0.58	0.26
	59		phase 3	t1+100ms	p.u.	0.25	N/A	N/A	0.58	0.26
	60		phase 1	t1+150ms	p.u.	0.25	N/A	N/A	0.57	0.26
	61		phase 2	t1+150ms	p.u.	0.25	N/A	N/A	0.57	0.26
	62		phase 3	t1+150ms	p.u.	0.25	N/A	N/A	0.57	0.26
	63		phase 1	t1+300ms	p.u.	0.24	N/A	N/A	0.57	0.26
	64		phase 2	t1+300ms	p.u.	0.24	N/A	N/A	0.57	0.26
	65		phase 3	t1+300ms	p.u.	0.24	N/A	N/A	0.57	0.26
	66		phase 1	t1+500ms	p.u.	0.24	N/A	N/A	0.57	0.27
	67		phase 2	t1+500ms	p.u.	0.24	N/A	N/A	0.57	0.27
	68		phase 3	t1+500ms	p.u.	0.24	N/A	N/A	0.57	0.27
	69		phase 1	t1+1000ms	p.u.	0.24	N/A	N/A	0.57	0.27
	70		phase 2	t1+1000ms	p.u.	0.24	N/A	N/A	0.57	0.27
	71		phase 3	t1+1000ms	p.u.	0.24	N/A	N/A	0.57	0.27
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.21	1.00	0.21	0.20	1.01

	No.	Parameter	Phase ref.	Time ref.	unit	5.2	5.3	5.4	5.5	6.1
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.045	0.024	0.022	0.043	0.158

	No.	Parameter	Phase ref.	Time ref.	unit	6.2	6.3	6.4	6.5	7.1
General Info.	1	Test number	--	--	--	6.2	6.3	6.4	6.5	7.1
	2	Date	--	--	dd.mm.yyyy	4.3.2025	28.3.2025	28.3.2025	17.3.2025	4.3.2025
	3	Time	--	--	hh:mm:ss.f	5:03:03 PM	5:20:48 PM	5:21:31 PM	2:26:00 PM	5:06:31 PM
	4	Type of fault	--	--	--	3-phase fault	2-phase fault	2-phase fault	3-phase fault	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.		1.15	1.15	1.15	
	6	Drop duration setpoint	--	--	ms	60020	60001	60002	60002	5021
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	60020	60000	60001	60001	5021
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	6.2	6.3	6.4	6.5	7.1
	15	Fault duration determined from test	--	--	ms	60020	60000	60001	60001	5021
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	1.15	1.15	1.15	1.15	1.19
	17		pos			1.15	1.07	1.07	1.15	1.19
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.00	1.00	1.00	1.01	1.01
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	1.00	1.01	1.01
	25		pos	t1-1s to t1	p.u.	1.00	1.00	1.00	1.01	1.01
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.21	1.00	0.20	0.37	1.00
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	0.31	0.00
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	0.31	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	0.21	1.00	0.20	0.21	1.00
	32	Active power	total	t1-10s to t1	p.u.	0.21	1.00	0.20	0.21	1.01
	33		total	t1-2s to t1	p.u.	0.21	1.00	0.20	0.21	1.01

	No.	Parameter	Phase ref.	Time ref.	unit	6.2	6.3	6.4	6.5	7.1
	34		pos	t1-500ms to t1-100ms	p.u.	0.21	1.00	0.20	0.21	1.01
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.86	2.38	2.20	2.23	1.90
	38		neg	--	--	N/A	2.05	2.06	N/A	N/A
	39	Reactive current settling up time	pos	--	ms	49	20	92	70	49
	40		neg	--	ms	N/A	32	38	N/A	N/A
	41	Reactive current settling time	pos	--	ms	49	20	92	70	49
	42		neg	--	ms	N/A	32	38	N/A	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	1.15	1.07	1.07	1.15	1.19
	44		neg	t1+100ms to t2-20ms	p.u.	0.00	0.07	0.07	0.00	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	-0.27	-0.17	-0.16	-0.01	-0.36
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	-0.15	-0.15	0.00	0.00
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.27	0.17	0.16	0.02	0.36
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.15	0.15	0.00	0.00
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.02	0.08	0.08	0.02	0.02
	50		pos	t1+100ms to t2-20ms	p.u.	0.02	0.02	0.02	0.02	0.02
	51	Short-circuit	phase1	t1 to	A	92.85	N/A	N/A	133.17	455.69

	No.	Parameter	Phase ref.	Time ref.	unit	6.2	6.3	6.4	6.5	7.1
		currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion		t1+20ms						
	52		phase2	t1 to t1+20ms	A	108.73	N/A	N/A	193.92	443.44
	53		phase3	t1 to t1+20ms	A	77.83	N/A	N/A	193.64	317.65
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.07	N/A	N/A	0.20	0.39
	55		phase 2	t1+20ms	p.u.	0.05	N/A	N/A	0.25	0.30
	56		phase 3	t1+20ms	p.u.	0.04	N/A	N/A	0.25	0.16
	57		phase 1	t1+100ms	p.u.	0.25	N/A	N/A	0.02	0.34
	58		phase 2	t1+100ms	p.u.	0.26	N/A	N/A	0.02	0.36
	59		phase 3	t1+100ms	p.u.	0.25	N/A	N/A	0.02	0.34
	60		phase 1	t1+150ms	p.u.	0.26	N/A	N/A	0.02	0.36
	61		phase 2	t1+150ms	p.u.	0.26	N/A	N/A	0.02	0.36
	62		phase 3	t1+150ms	p.u.	0.26	N/A	N/A	0.02	0.36
	63		phase 1	t1+300ms	p.u.	0.26	N/A	N/A	0.02	0.35
	64		phase 2	t1+300ms	p.u.	0.26	N/A	N/A	0.02	0.35
	65		phase 3	t1+300ms	p.u.	0.26	N/A	N/A	0.02	0.35
	66		phase 1	t1+500ms	p.u.	0.27	N/A	N/A	0.02	0.36
	67		phase 2	t1+500ms	p.u.	0.27	N/A	N/A	0.02	0.36
	68		phase 3	t1+500ms	p.u.	0.27	N/A	N/A	0.02	0.36
	69		phase 1	t1+1000ms	p.u.	0.26	N/A	N/A	0.02	0.36
	70		phase 2	t1+1000ms	p.u.	0.26	N/A	N/A	0.02	0.36
	71		phase 3	t1+1000ms	p.u.	0.26	N/A	N/A	0.02	0.36
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.21	1.00	0.20	0.21	1.01

	No.	Parameter	Phase ref.	Time ref.	unit	6.2	6.3	6.4	6.5	7.1
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.159	0.114	0.113	0.128	0.159

	No.	Parameter	Phase ref.	Time ref.	unit	7.2	7.3	7.4	7.5	7.6
General Info.	1	Test number	--	--	--	7.2	7.3	7.4	7.5	7.6
	2	Date	--	--	dd.mm.yyyy	4.3.2025	28.3.2025	28.3.2025	17.3.2025	4.3.2025
	3	Time	--	--	hh:mm:ss.f	5:07:12 PM	5:23:13 PM	5:23:51 PM	2:28:03 PM	5:09:55 PM
	4	Type of fault	--	--	--	3-phase fault	2-phase fault	2-phase fault	3-phase fault	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	1.19	1.19	1.19	1.20	1.20
	6	Drop duration setpoint	--	--	ms	5021	5022	5002	5002	5001
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	5021	5021	5001	5001	5001
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	7.2	7.3	7.4	7.5	7.6
	15	Fault duration determined from test	--	--	ms	5021	5021	5001	5001	5001
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	1.19	1.19	1.19	1.20	1.20
	17		pos			1.19	1.09	1.09	1.20	1.20
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.00	1.00	1.00	1.01	1.00
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	1.00	1.01	1.00
	25		pos	t1-1s to t1	p.u.	1.00	1.00	1.00	1.01	1.00
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.21	1.00	0.20	0.37	1.00
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	0.31	0.00
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	0.31	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	0.21	1.00	0.20	0.21	1.00
	32	Active power	total	t1-10s to t1	p.u.	0.21	1.00	0.21	0.21	1.00
	33		total	t1-2s to t1	p.u.	0.21	1.00	0.21	0.21	1.00

	No.	Parameter	Phase ref.	Time ref.	unit	7.2	7.3	7.4	7.5	7.6
	34		pos	t1-500ms to t1-100ms	p.u.	0.21	1.00	0.20	0.21	1.00
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.88	2.23	2.19	2.21	N/A
	38		neg	--	--	N/A	2.04	2.05	N/A	N/A
	39	Reactive current settling up time	pos	--	ms	53	21	82	66	N/A
	40		neg	--	ms	N/A	36	39	N/A	N/A
	41	Reactive current settling time	pos	--	ms	53	21	82	66	N/A
	42		neg	--	ms	N/A	36	39	N/A	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	1.19	1.09	1.09	1.20	1.20
	44		neg	t1+100ms to t2-20ms	p.u.	0.00	0.10	0.10	0.00	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	-0.36	-0.20	-0.20	-0.11	0.01
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	-0.20	-0.20	0.00	0.00
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.36	0.20	0.20	0.11	0.02
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.20	0.20	0.00	0.00
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.02	0.11	0.11	0.02	0.02
	50		pos	t1+100ms to t2-20ms	p.u.	0.02	0.02	0.02	0.02	0.02
	51	Short-circuit	phase1	t1 to	A	121.19	N/A	N/A	156.68	448.69

	No.	Parameter	Phase ref.	Time ref.	unit	7.2	7.3	7.4	7.5	7.6
		currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion		t1+20ms						
	52		phase2	t1 to t1+20ms	A	103.56	N/A	N/A	203.34	437.13
	53		phase3	t1 to t1+20ms	A	65.88	N/A	N/A	210.86	302.43
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.08	N/A	N/A	0.17	0.34
	55		phase 2	t1+20ms	p.u.	0.07	N/A	N/A	0.22	0.27
	56		phase 3	t1+20ms	p.u.	0.01	N/A	N/A	0.24	0.12
	57		phase 1	t1+100ms	p.u.	0.34	N/A	N/A	0.10	0.03
	58		phase 2	t1+100ms	p.u.	0.35	N/A	N/A	0.10	0.02
	59		phase 3	t1+100ms	p.u.	0.35	N/A	N/A	0.09	0.02
	60		phase 1	t1+150ms	p.u.	0.35	N/A	N/A	0.10	0.03
	61		phase 2	t1+150ms	p.u.	0.35	N/A	N/A	0.10	0.03
	62		phase 3	t1+150ms	p.u.	0.35	N/A	N/A	0.10	0.03
	63		phase 1	t1+300ms	p.u.	0.35	N/A	N/A	0.11	0.03
	64		phase 2	t1+300ms	p.u.	0.35	N/A	N/A	0.11	0.03
	65		phase 3	t1+300ms	p.u.	0.35	N/A	N/A	0.11	0.03
	66		phase 1	t1+500ms	p.u.	0.36	N/A	N/A	0.11	0.02
	67		phase 2	t1+500ms	p.u.	0.36	N/A	N/A	0.11	0.02
	68		phase 3	t1+500ms	p.u.	0.36	N/A	N/A	0.11	0.02
	69		phase 1	t1+1000ms	p.u.	0.35	N/A	N/A	0.11	0.03
	70		phase 2	t1+1000ms	p.u.	0.35	N/A	N/A	0.11	0.03
	71		phase 3	t1+1000ms	p.u.	0.35	N/A	N/A	0.11	0.03
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.21	1.00	0.20	0.21	1.00

	No.	Parameter	Phase ref.	Time ref.	unit	7.2	7.3	7.4	7.5	7.6
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.159	0.115	0.113	0.133	0.161

	No.	Parameter	Phase ref.	Time ref.	unit	7.7	8.1	8.2	8.3	8.4
General Info.	1	Test number	--	--	--	7.7	8.1	8.2	8.3	8.4
	2	Date	--	--	dd.mm.yyyy	4.3.2025	4.3.2025	4.3.2025	17.3.2025	17.3.2025
	3	Time	--	--	hh:mm:ss.f	5:10:57 PM	5:11:33 PM	5:12:05 PM	2:28:41 PM	2:29:26 PM
	4	Type of fault	--	--	--	2-phase fault	3-phase fault	3-phase fault	2-phase fault	2-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.		1.25	1.25	1.23	1.23
	6	Drop duration setpoint	--	--	ms	103	103	103	103	103
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	5001	121	121	102	102
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A

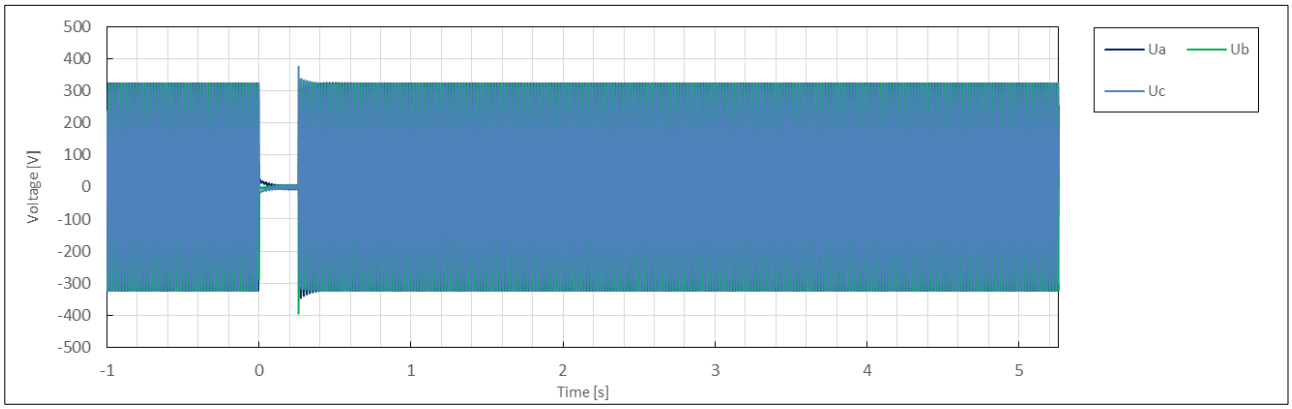
	No.	Parameter	Phase ref.	Time ref.	unit	7.7	8.1	8.2	8.3	8.4
	15	Fault duration determined from test	--	--	ms	5001	121	121	102	102
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	1.20	1.24	1.24	1.23	1.23
	17		pos			1.10	1.24	1.24	1.12	1.12
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.01	1.01	1.00	1.01	1.00
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.01	1.01	1.00	1.01	1.00
	25		pos	t1-1s to t1	p.u.	1.01	1.01	1.00	1.01	1.00
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	0.21	1.00	0.21
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	1.00	1.00	0.21	1.00	0.21
	32	Active power	total	t1-10s to t1	p.u.	1.00	1.01	0.21	1.01	0.21
	33		total	t1-2s to t1	p.u.	1.00	1.01	0.21	1.01	0.21

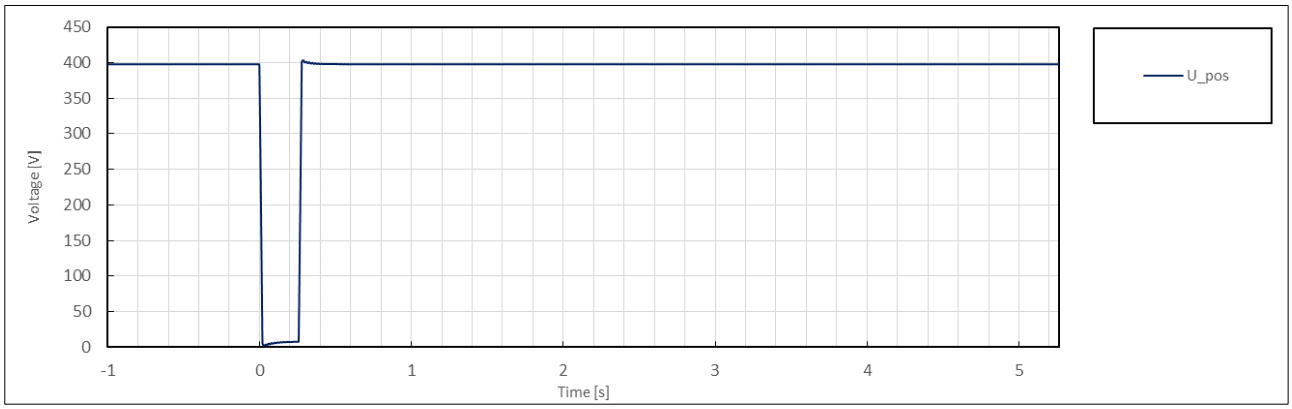
	No.	Parameter	Phase ref.	Time ref.	unit	7.7	8.1	8.2	8.3	8.4
	34		pos	t1-500ms to t1-100ms	p.u.	1.00	1.01	0.21	1.00	0.21
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	N/A	1.87	1.86	1.86	1.82
	38		neg	--	--	N/A	N/A	N/A	1.97	1.95
	39	Reactive current settling up time	pos	--	ms	N/A	47	48	28	48
	40		neg	--	ms	N/A	N/A	N/A	59	57
	41	Reactive current settling time	pos	--	ms	N/A	47	48	28	48
	42		neg	--	ms	N/A	N/A	N/A	59	57
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	1.10	1.24	1.24	1.12	1.12
	44		neg	t1+100ms to t2-20ms	p.u.	0.10	0.00	0.00	0.12	0.12
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.01	-0.44	-0.44	-0.21	-0.21
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	0.00	0.00	-0.23	-0.23
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.02	0.44	0.44	0.21	0.21
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.00	0.00	0.23	0.23
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.02	0.02	0.01	0.14	0.14
	50		pos	t1+100ms to t2-20ms	p.u.	0.02	0.02	0.01	0.02	0.02
	51	Short-circuit	phase1	t1 to	A	N/A	452.84	138.69	N/A	N/A

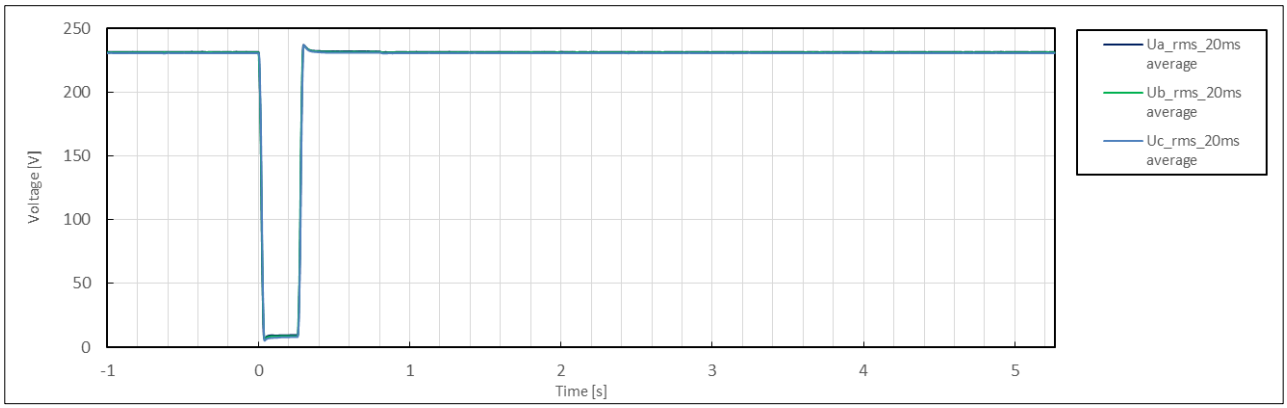
	No.	Parameter	Phase ref.	Time ref.	unit	7.7	8.1	8.2	8.3	8.4
		currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion		t1+20ms						
	52		phase2	t1 to t1+20ms	A	N/A	457.46	148.77	N/A	N/A
	53		phase3	t1 to t1+20ms	A	N/A	338.88	131.75	N/A	N/A
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	N/A	0.39	0.10	N/A	N/A
	55		phase 2	t1+20ms	p.u.	N/A	0.27	0.08	N/A	N/A
	56		phase 3	t1+20ms	p.u.	N/A	0.25	0.04	N/A	N/A
	57		phase 1	t1+100ms	p.u.	N/A	0.43	0.43	N/A	N/A
	58		phase 2	t1+100ms	p.u.	N/A	0.45	0.44	N/A	N/A
	59		phase 3	t1+100ms	p.u.	N/A	0.43	0.44	N/A	N/A
	60		phase 1	t1+150ms	p.u.	N/A	0.10	0.12	N/A	N/A
	61		phase 2	t1+150ms	p.u.	N/A	0.10	0.12	N/A	N/A
	62		phase 3	t1+150ms	p.u.	N/A	0.10	0.12	N/A	N/A
	63		phase 1	t1+300ms	p.u.	N/A	1.01	0.20	N/A	N/A
	64		phase 2	t1+300ms	p.u.	N/A	1.01	0.20	N/A	N/A
	65		phase 3	t1+300ms	p.u.	N/A	1.01	0.20	N/A	N/A
	66		phase 1	t1+500ms	p.u.	N/A	0.99	0.21	N/A	N/A
	67		phase 2	t1+500ms	p.u.	N/A	0.99	0.21	N/A	N/A
	68		phase 3	t1+500ms	p.u.	N/A	0.99	0.21	N/A	N/A
	69		phase 1	t1+1000ms	p.u.	N/A	0.99	0.21	N/A	N/A
	70		phase 2	t1+1000ms	p.u.	N/A	0.99	0.21	N/A	N/A
	71		phase 3	t1+1000ms	p.u.	N/A	0.99	0.21	N/A	N/A
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	1.00	1.01	0.21	1.01	0.21

	No.	Parameter	Phase ref.	Time ref.	unit	7.7	8.1	8.2	8.3	8.4
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.157	0.16	0.161	0.117	0.116

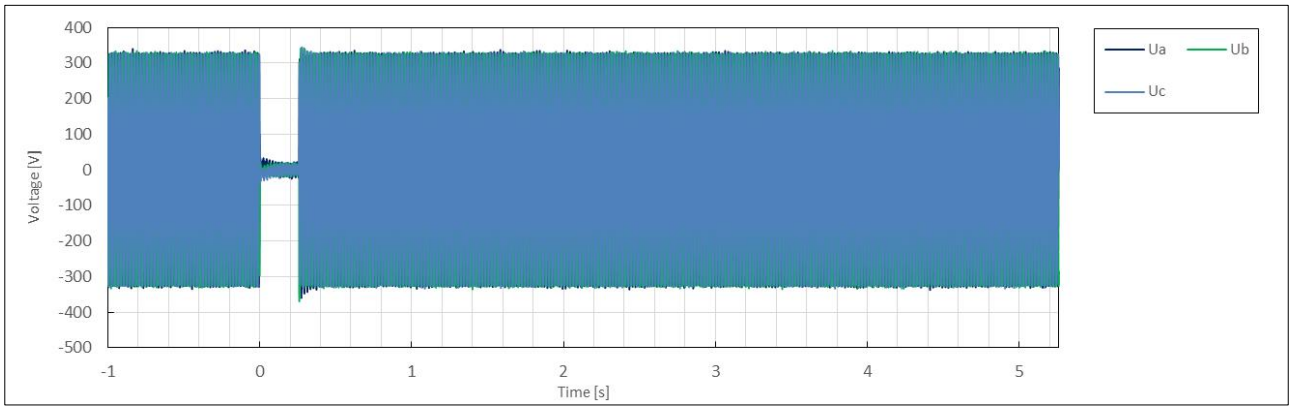
No. 1.1 Idle Test

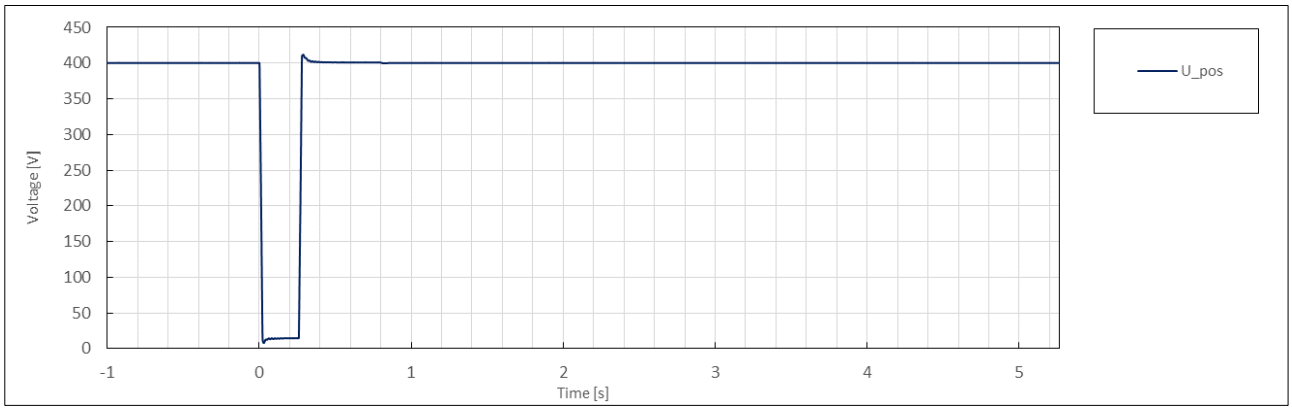


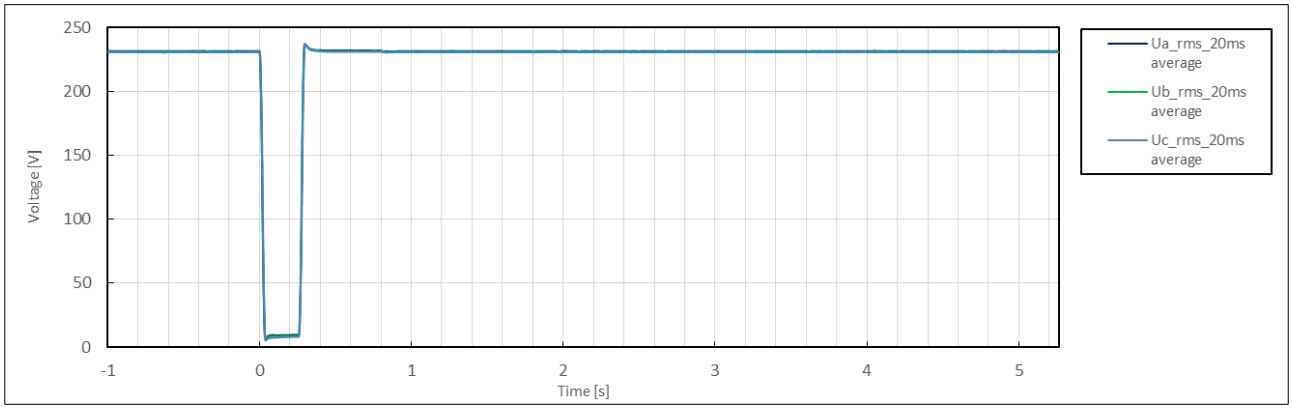


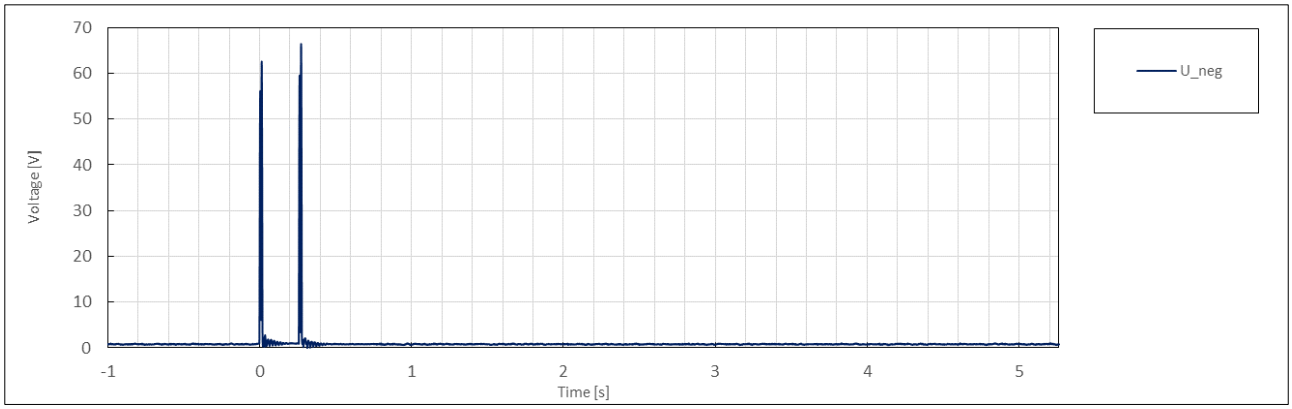


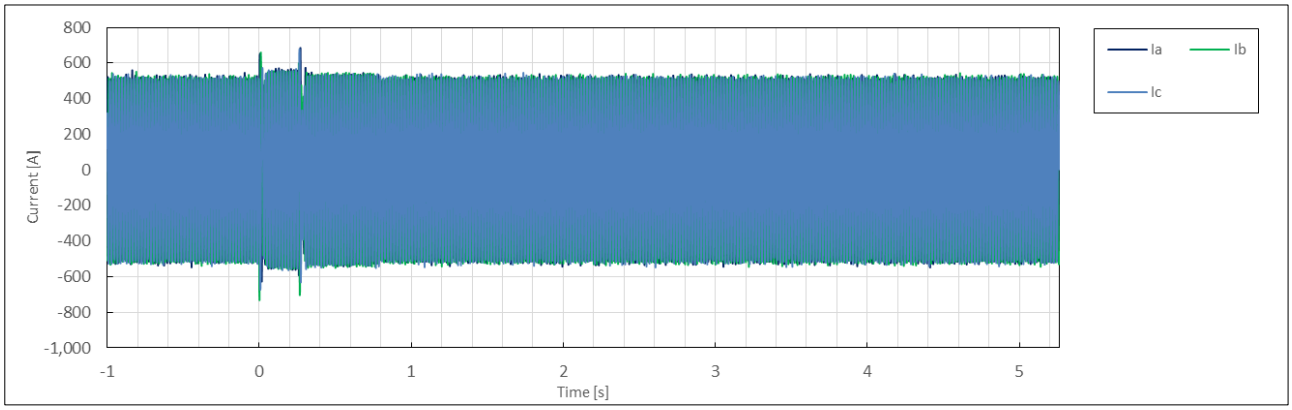
No. 1.1 Load Test

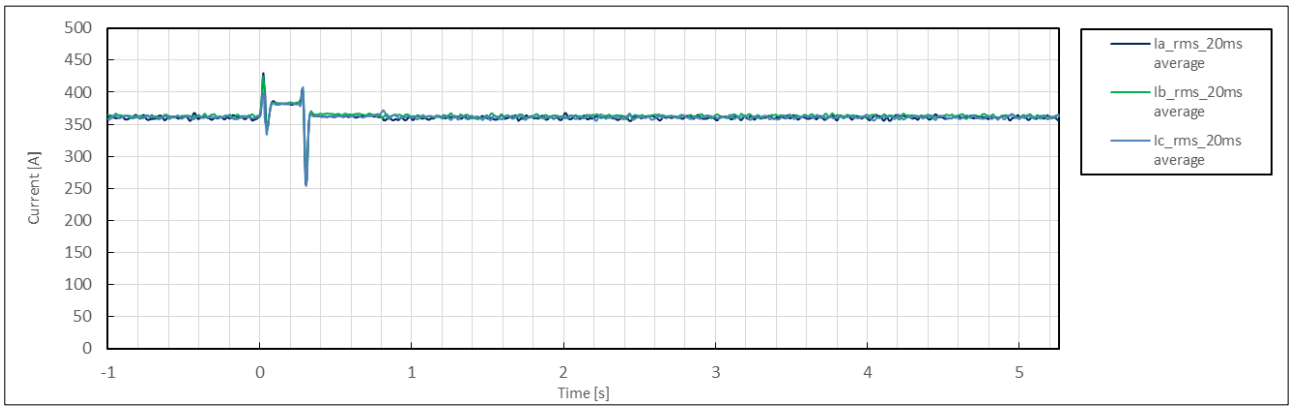


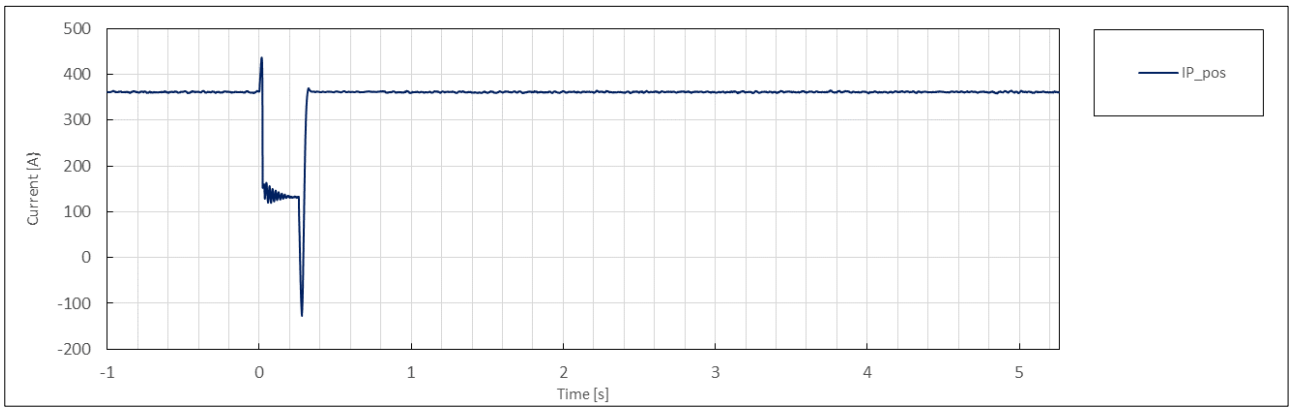


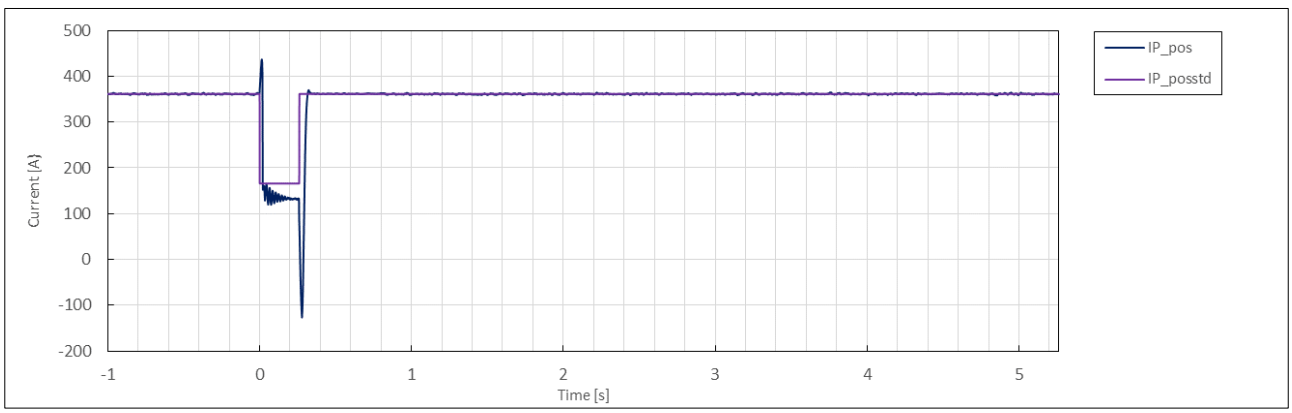


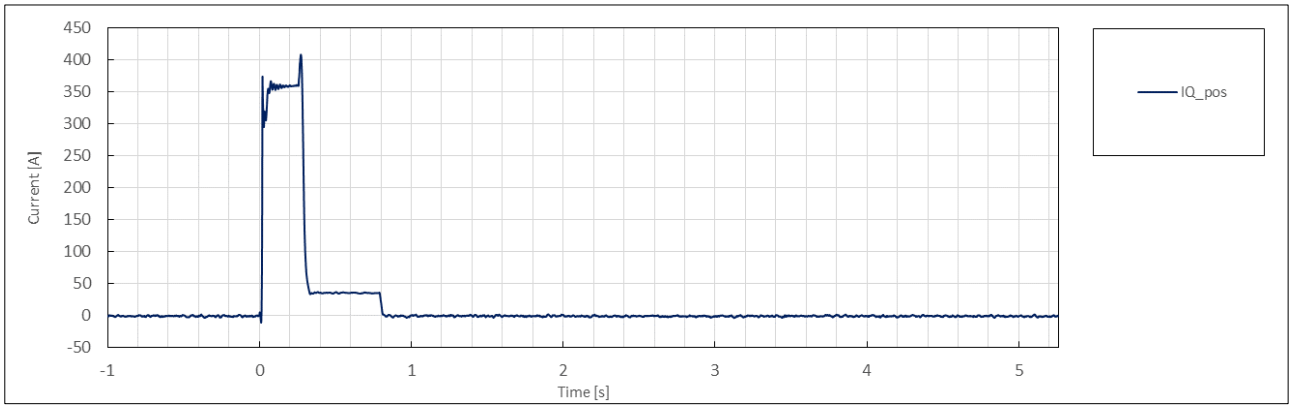


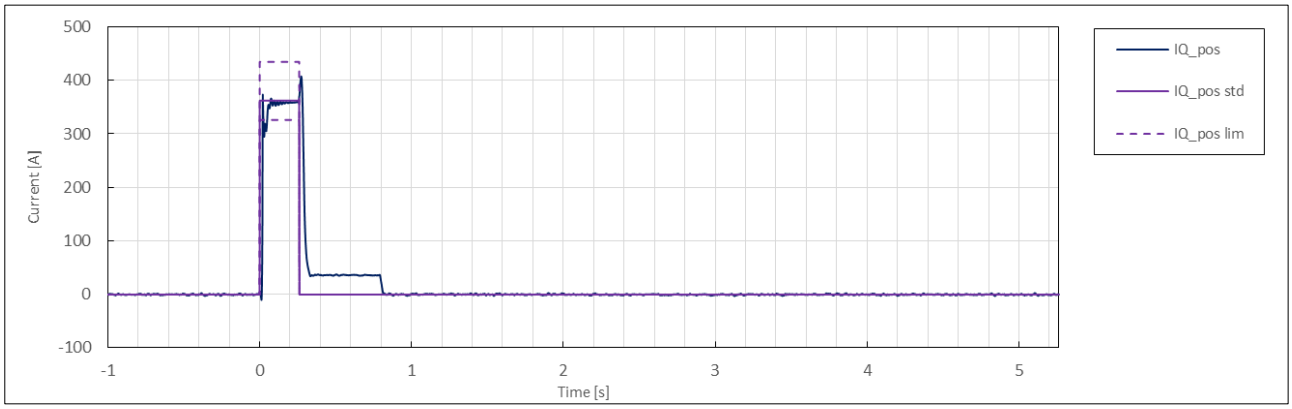

Current [A]
Time [s]
Ia
Ib
Ic

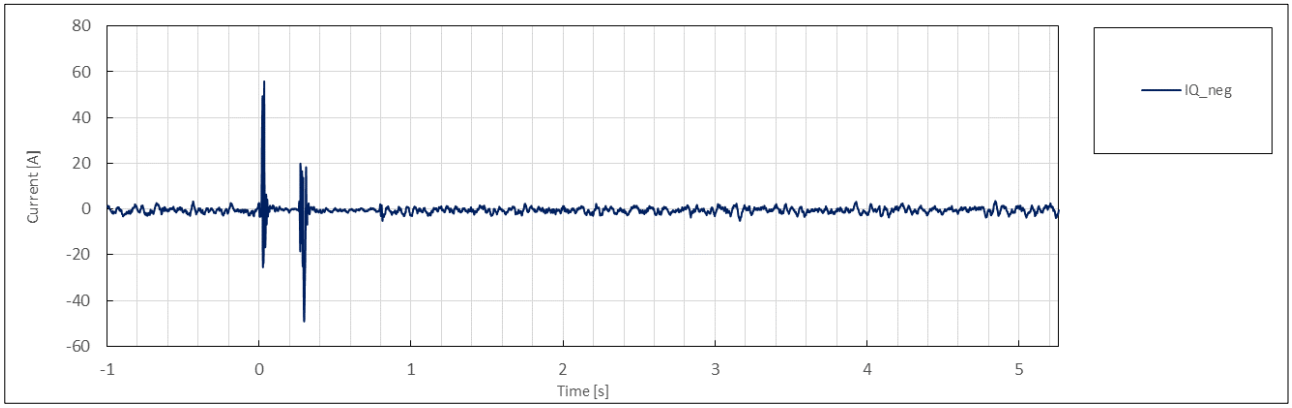

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

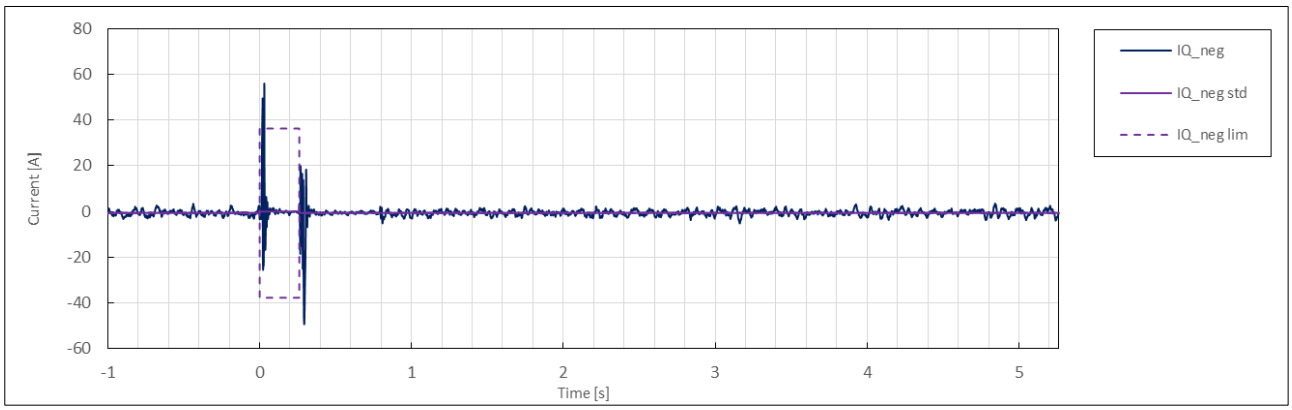

Current [A]
Time [s]
IP_pos

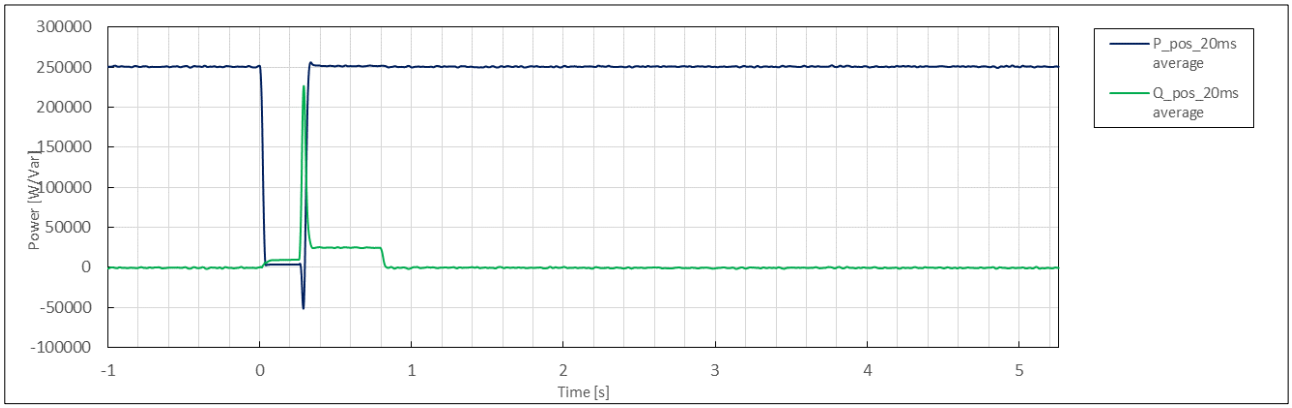

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

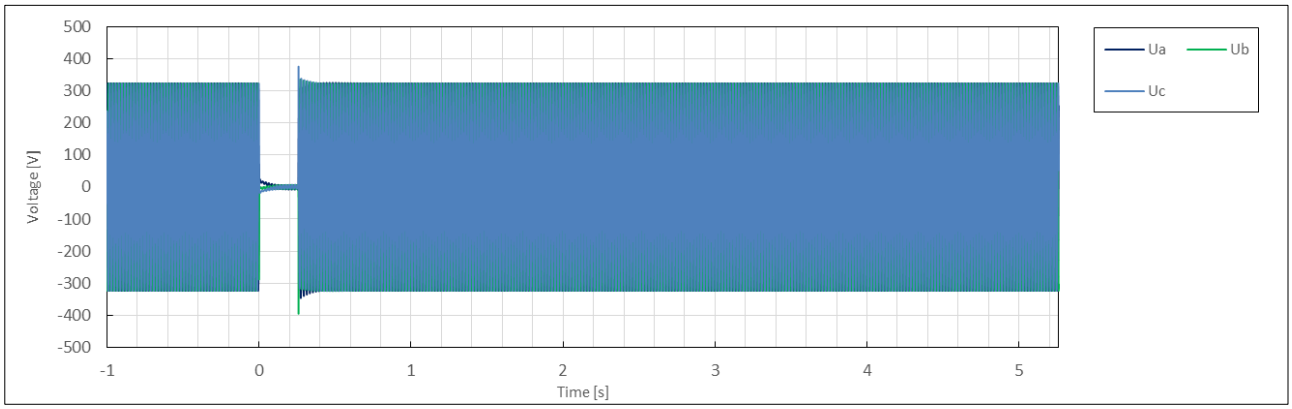

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

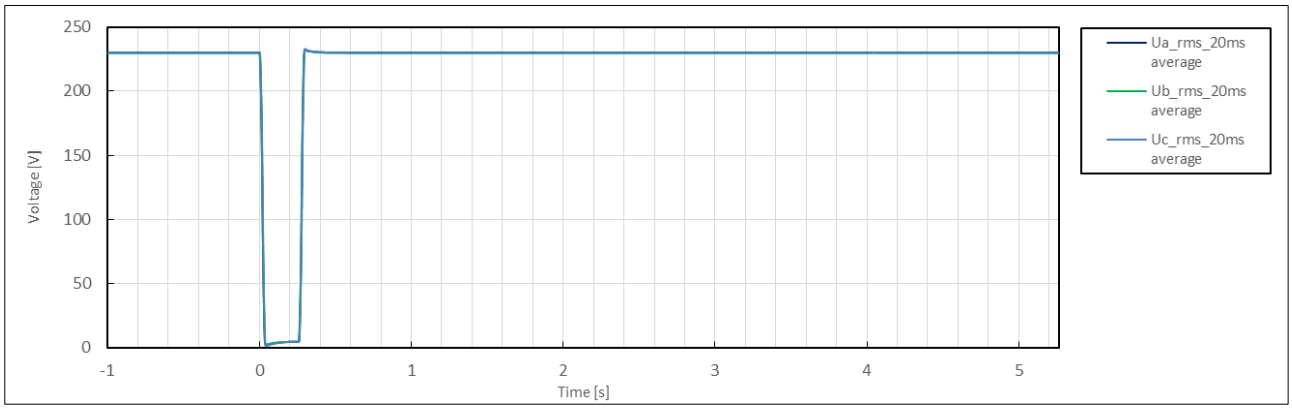

Current [A]
Time [s]
IQ_neg

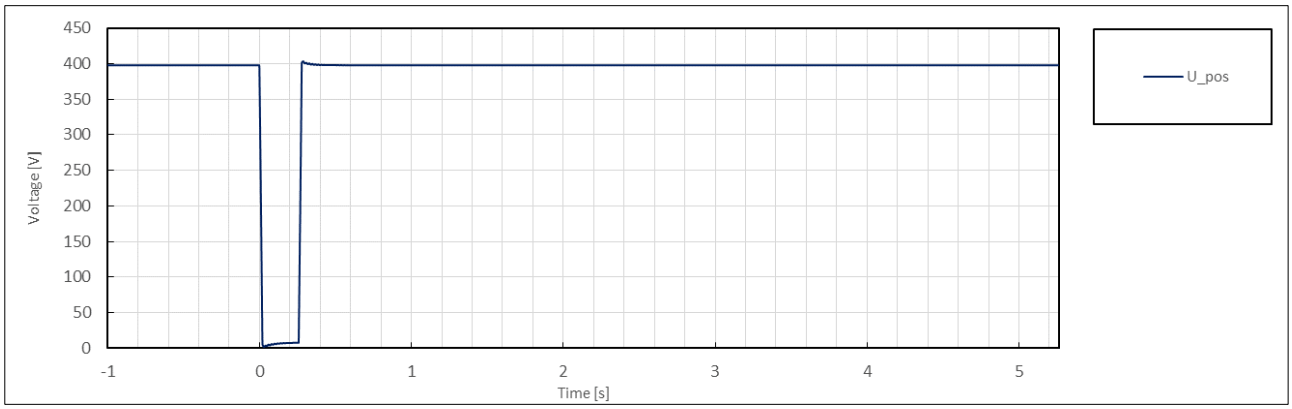

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

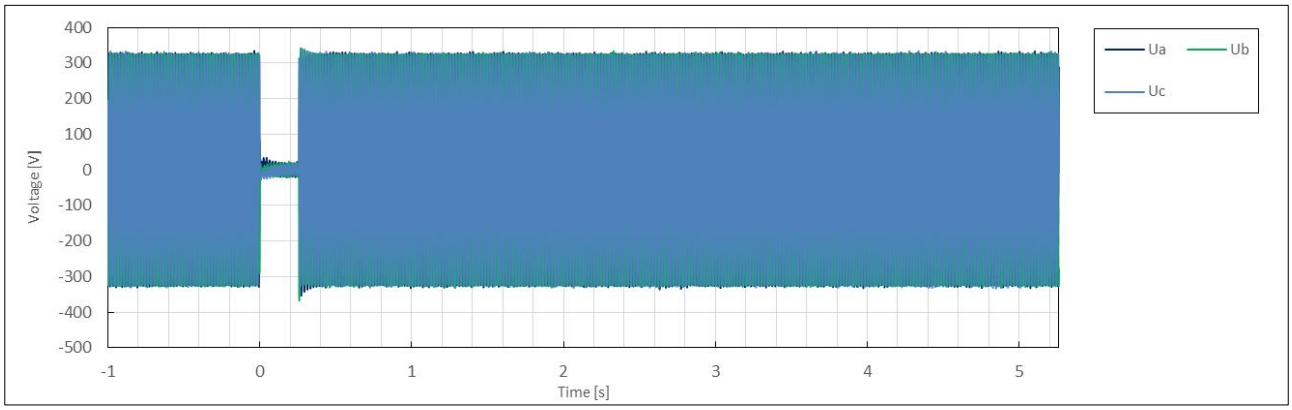
No. 1.2 Idle Test

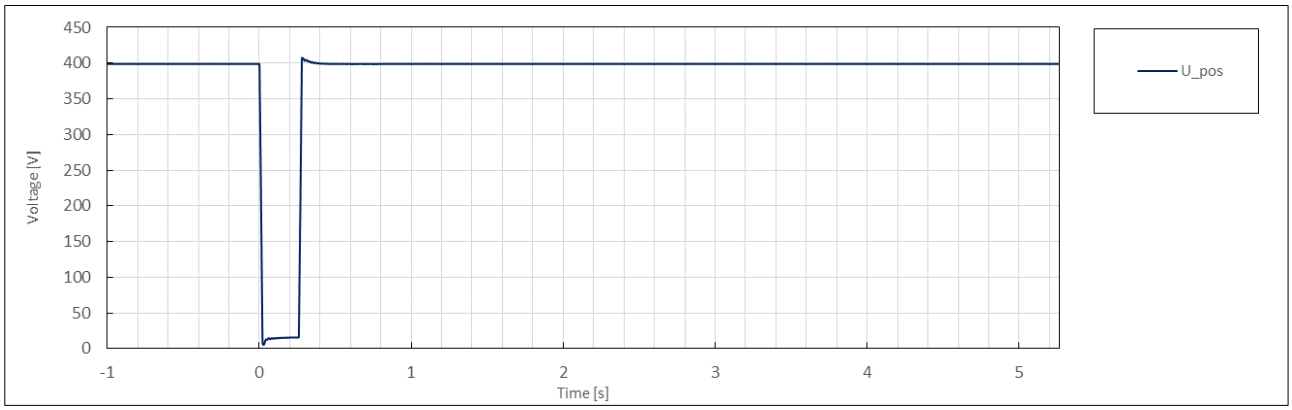


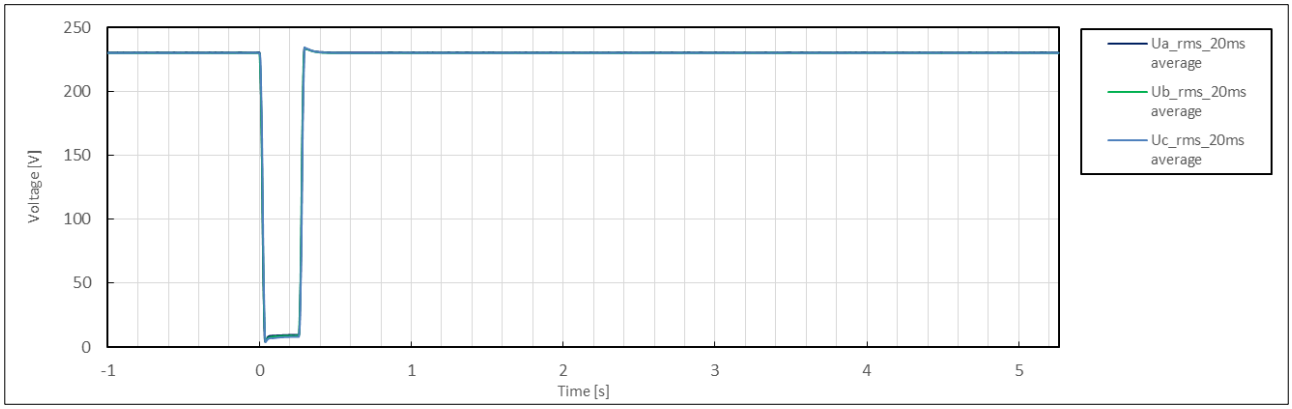


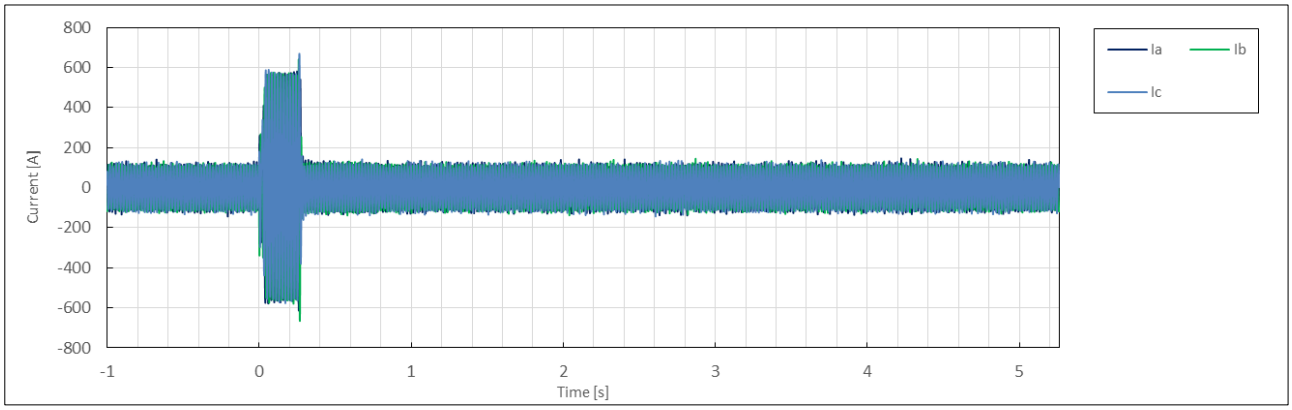


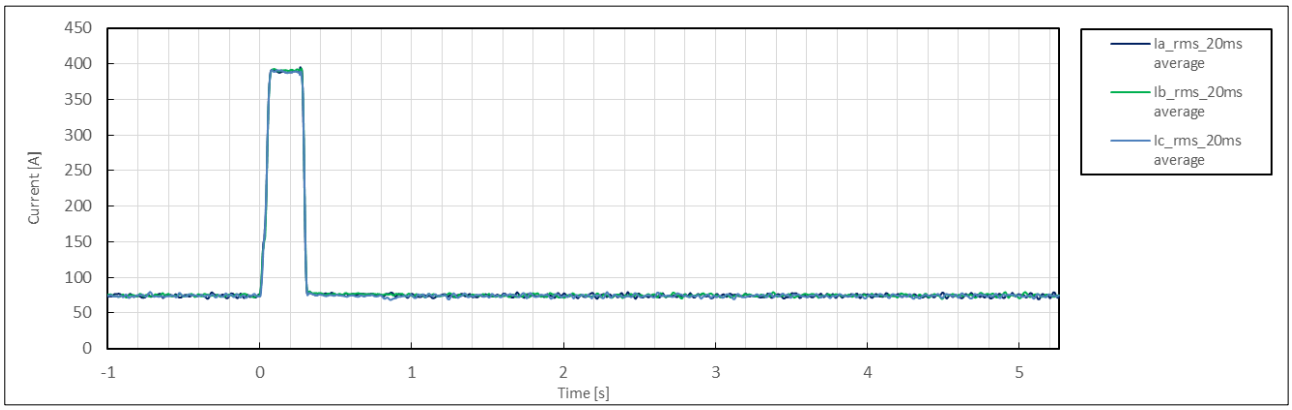
No. 1.2 Load Test

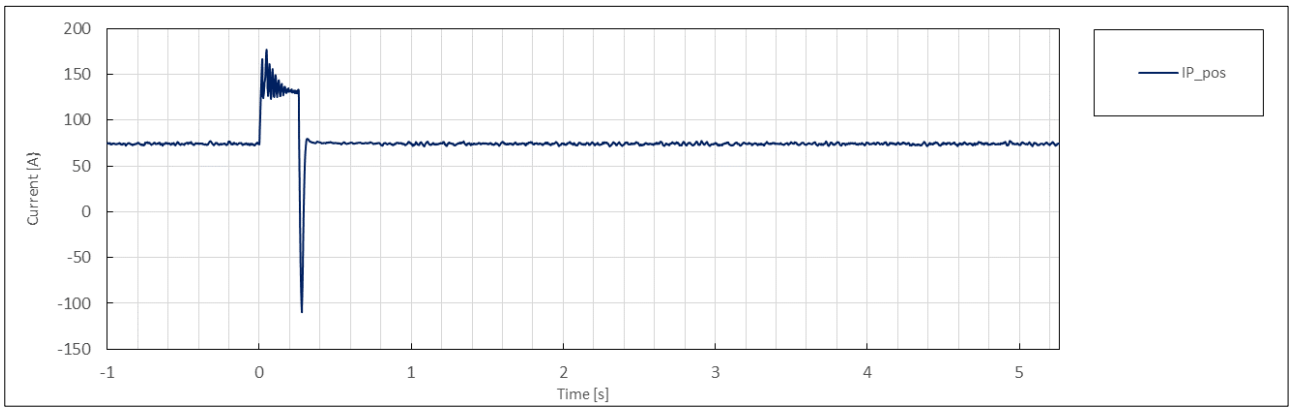


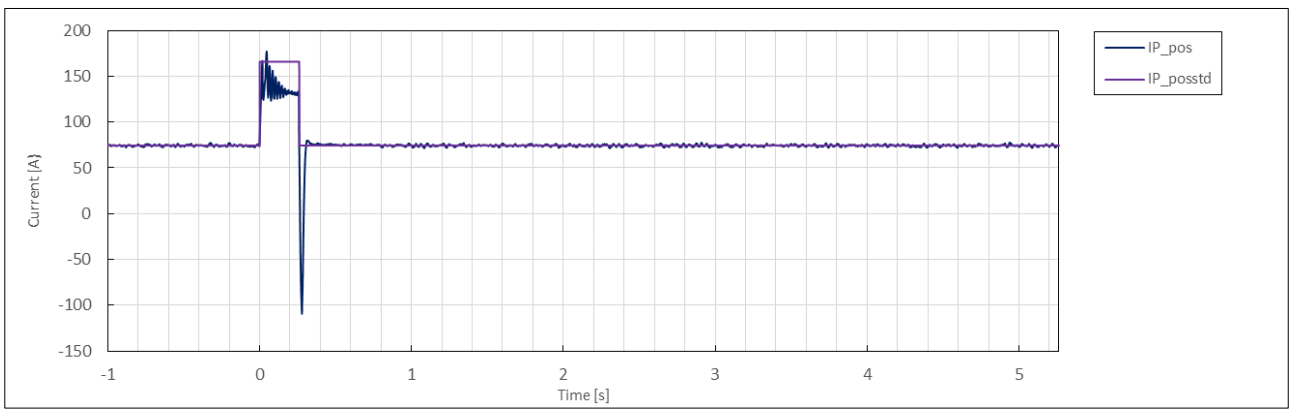


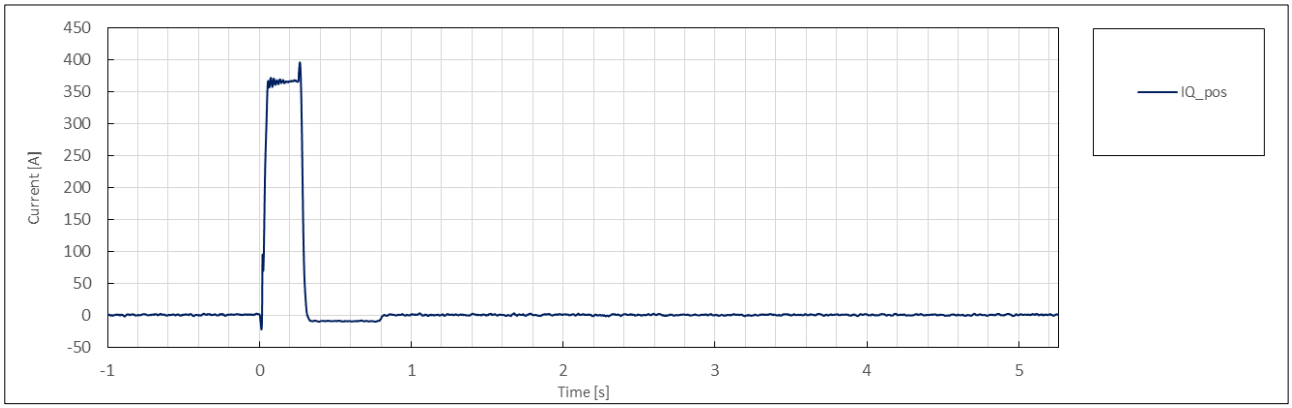


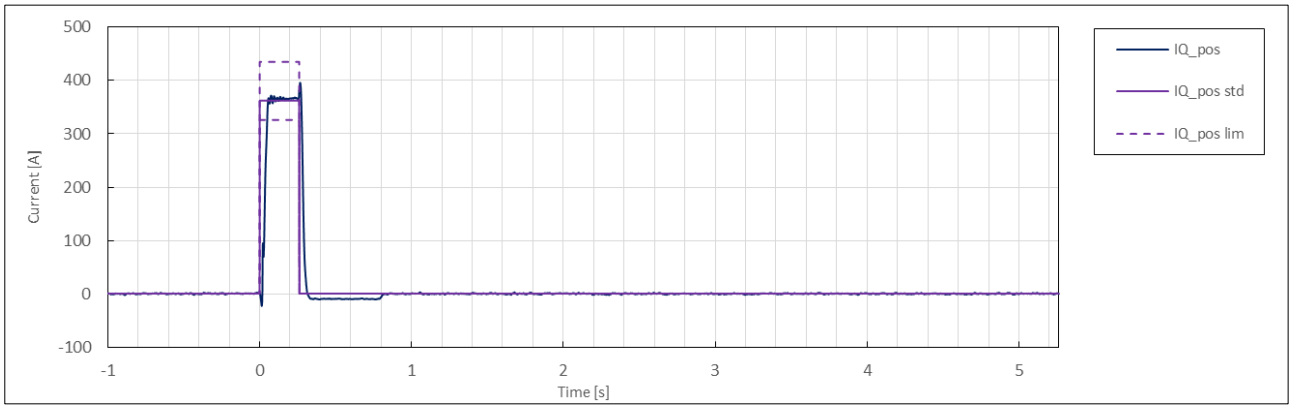

Current [A]
Time [s]
Ia
Ib
Ic

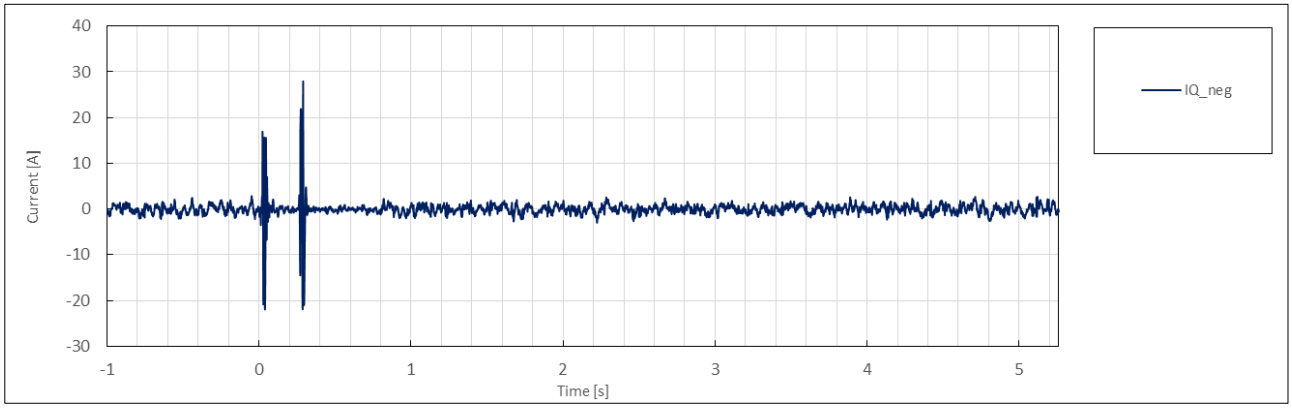

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

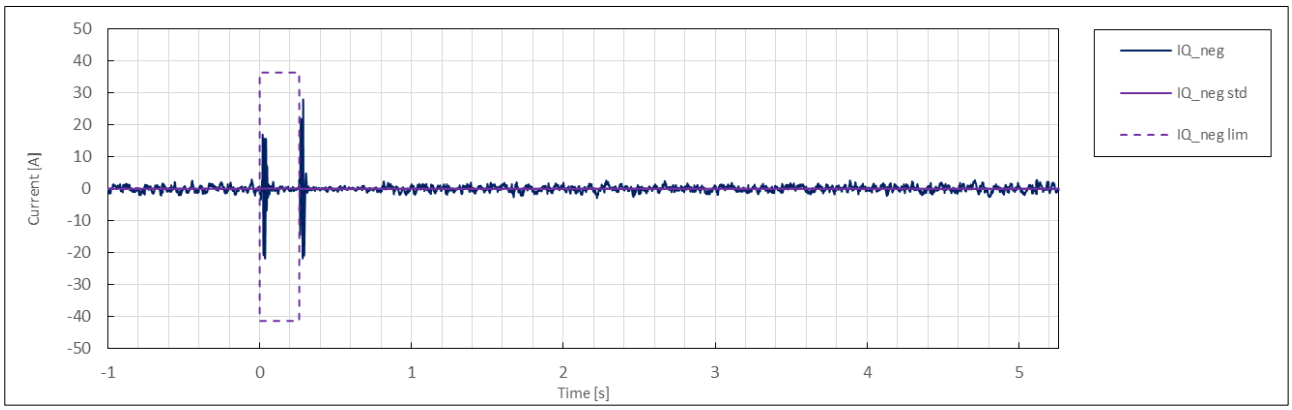

Current [A]
Time [s]
IP_pos

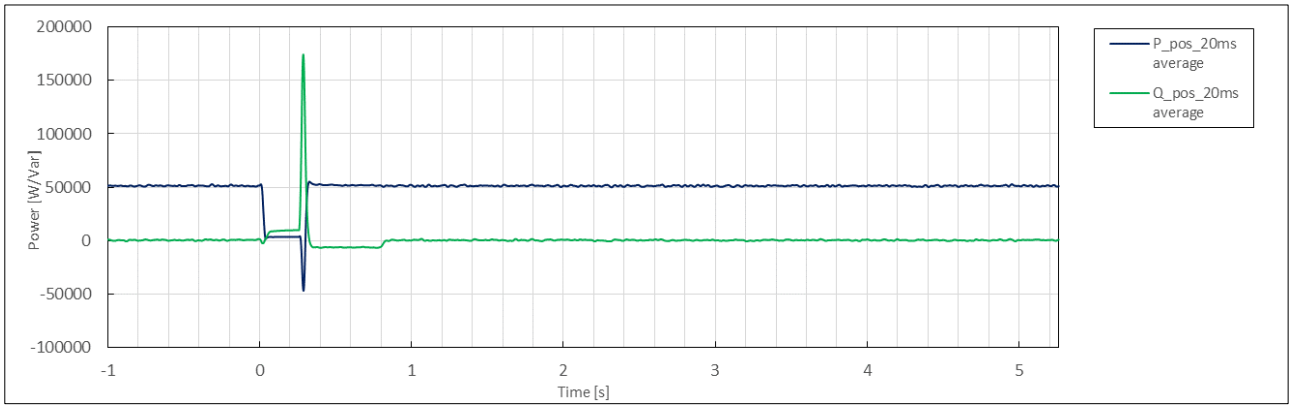

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

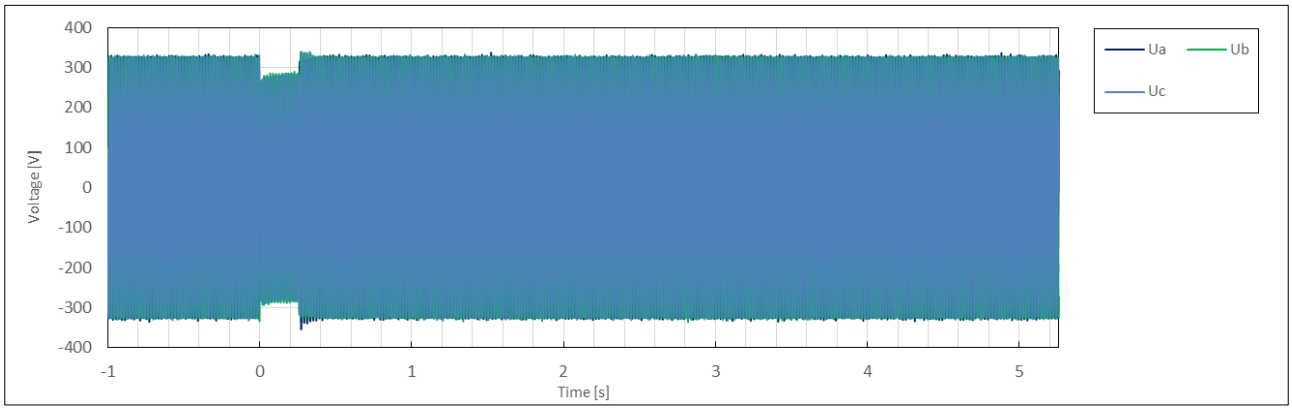

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

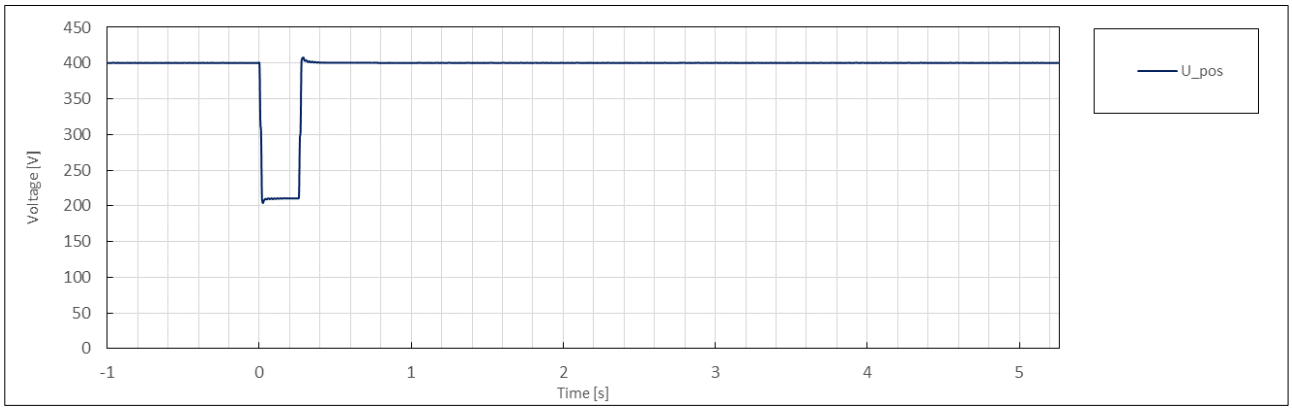

Current [A]
Time [s]
IQ_neg

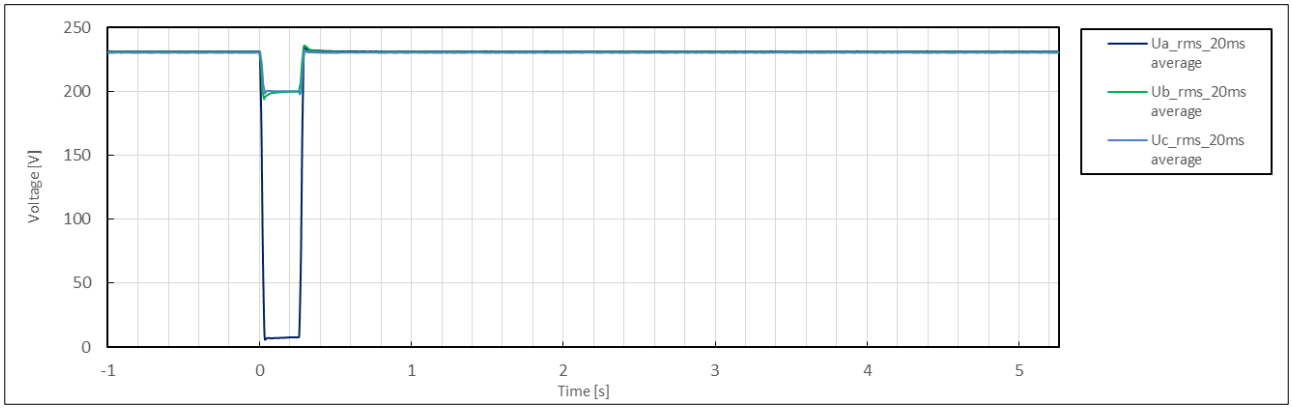

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


200000
150000
100000
50000
0
-50000
-100000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

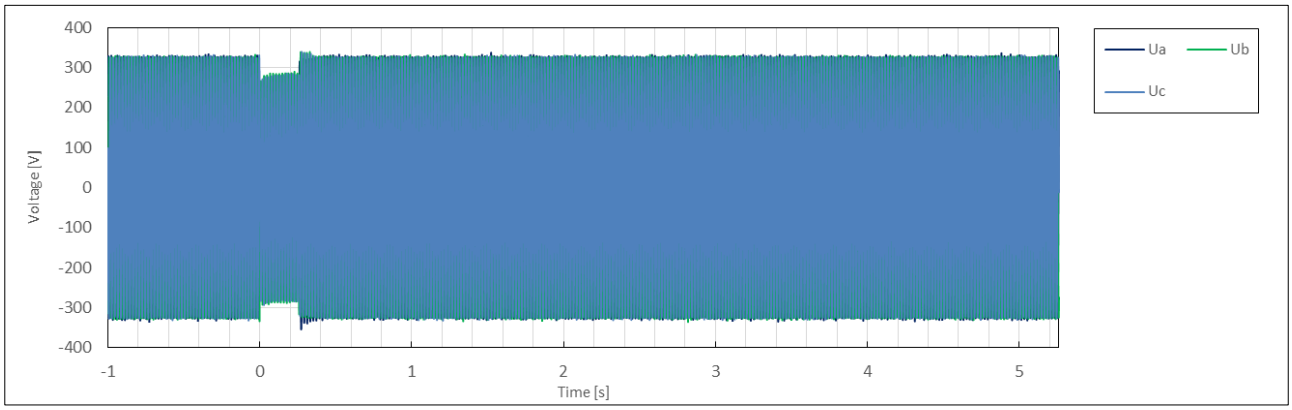
No. 1.3 Idle Test

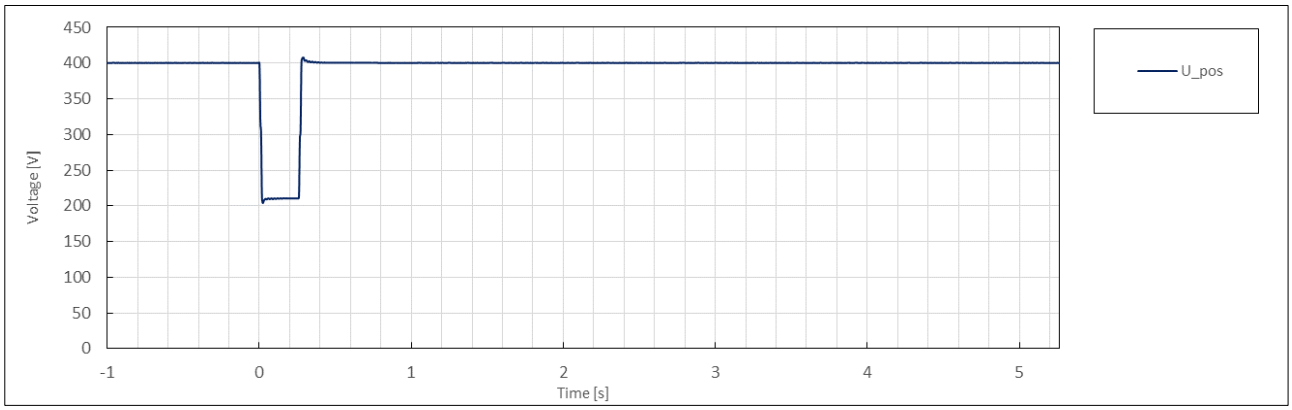


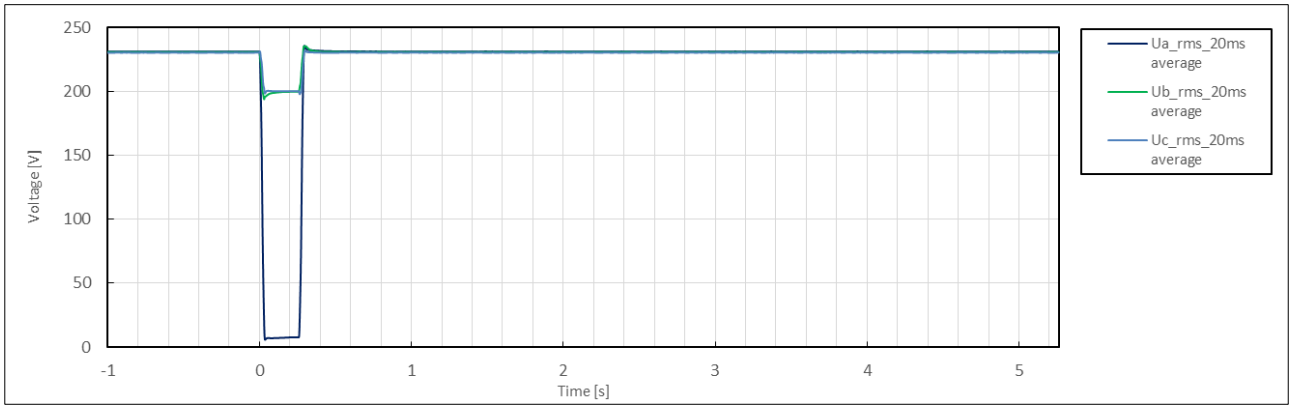


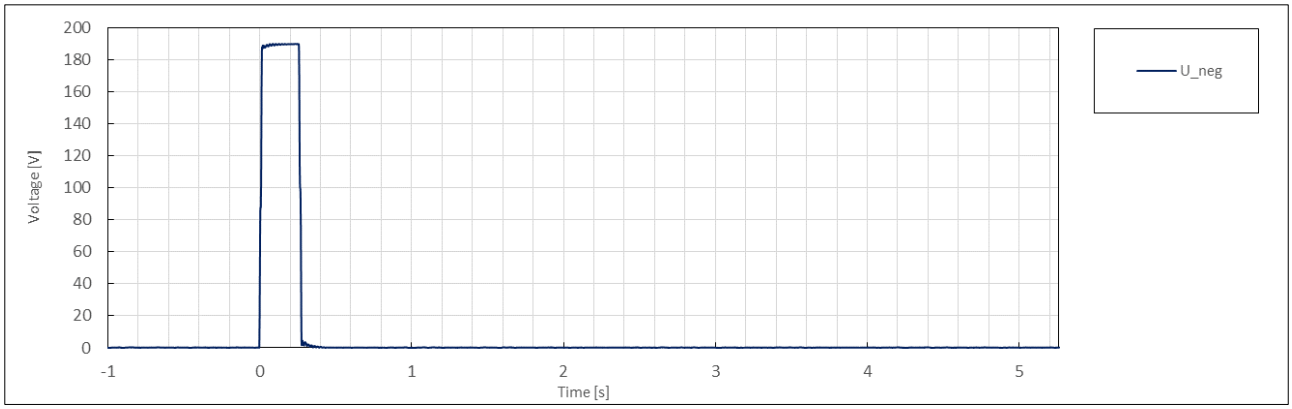


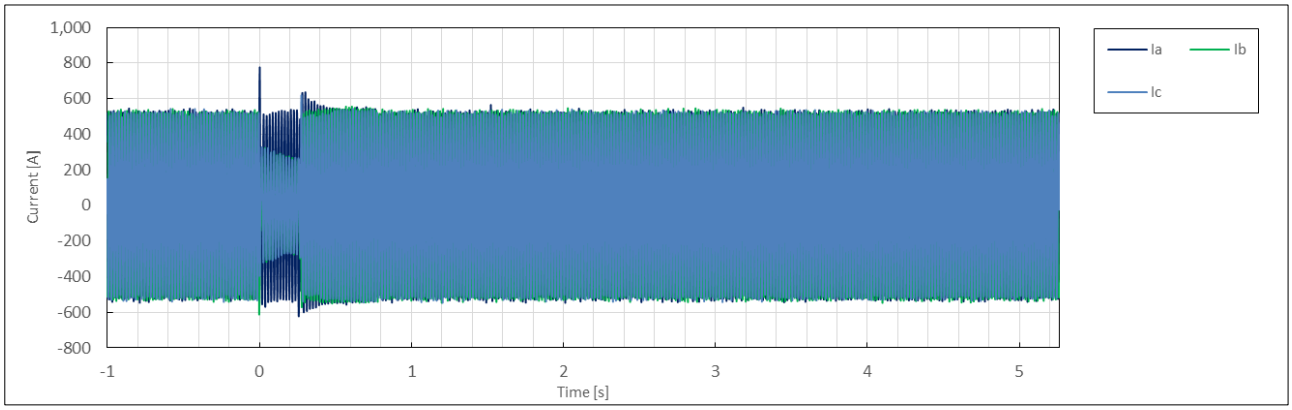
No. 1.3 Load Test

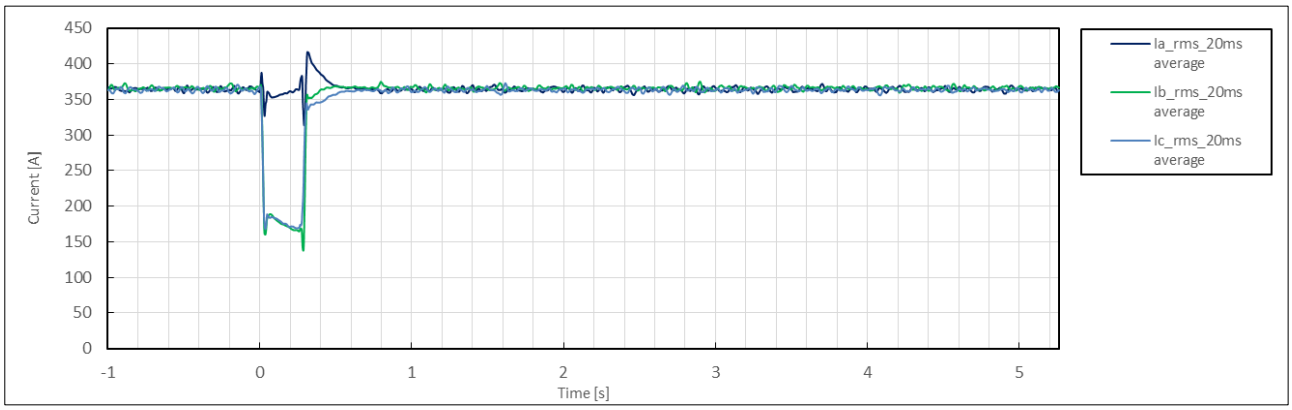


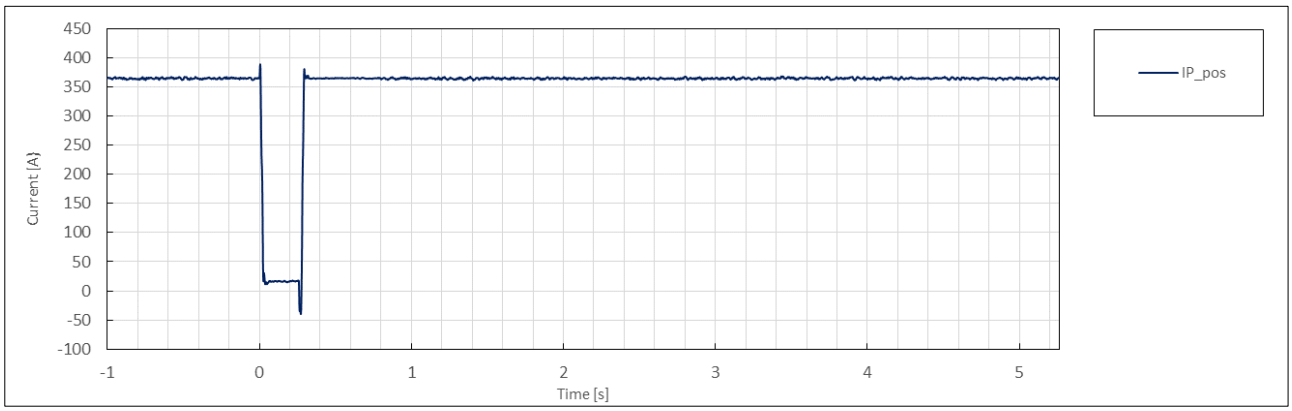


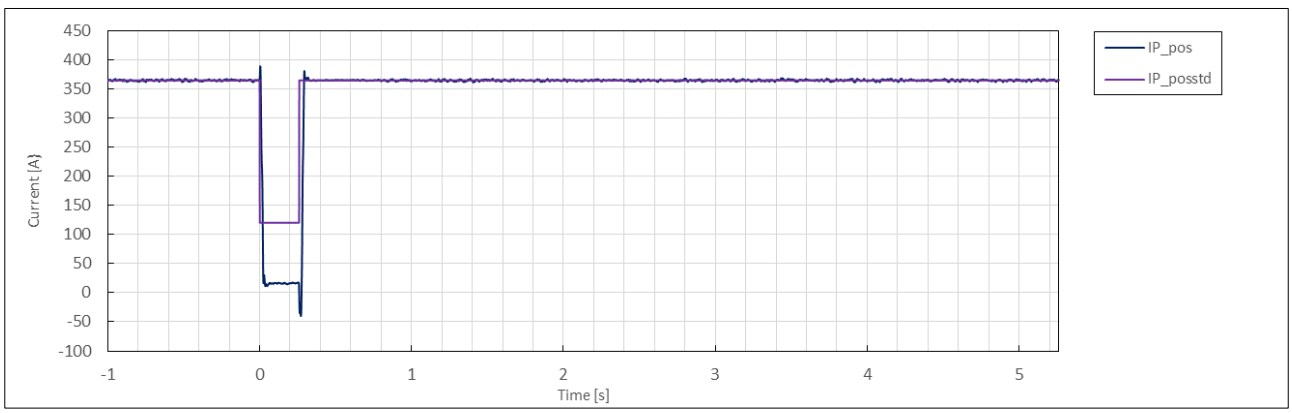


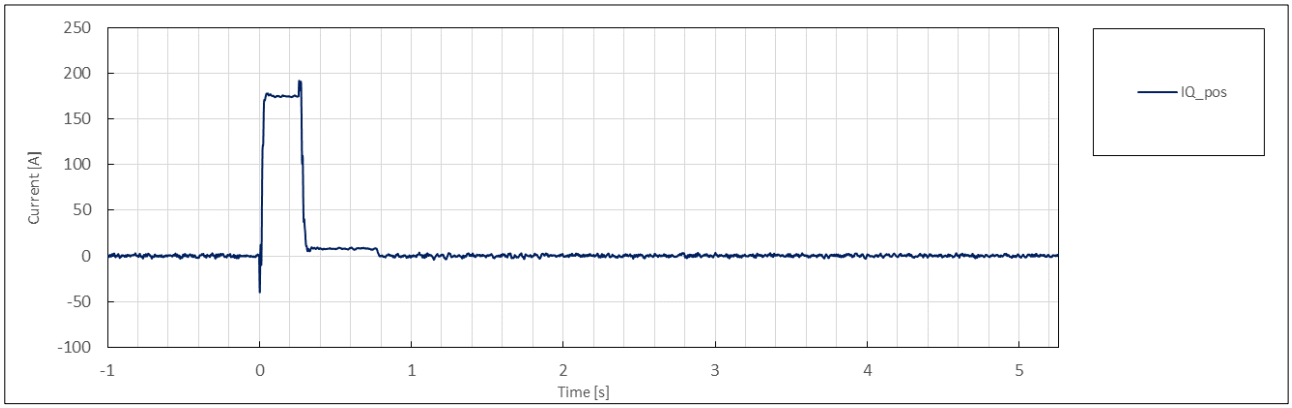


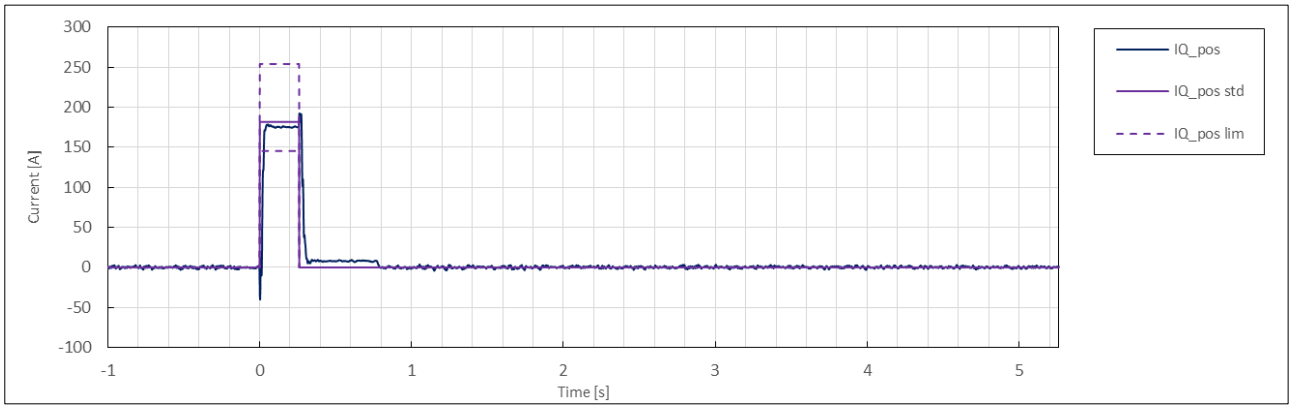

Current [A]
Time [s]
Ia
Ib
Ic

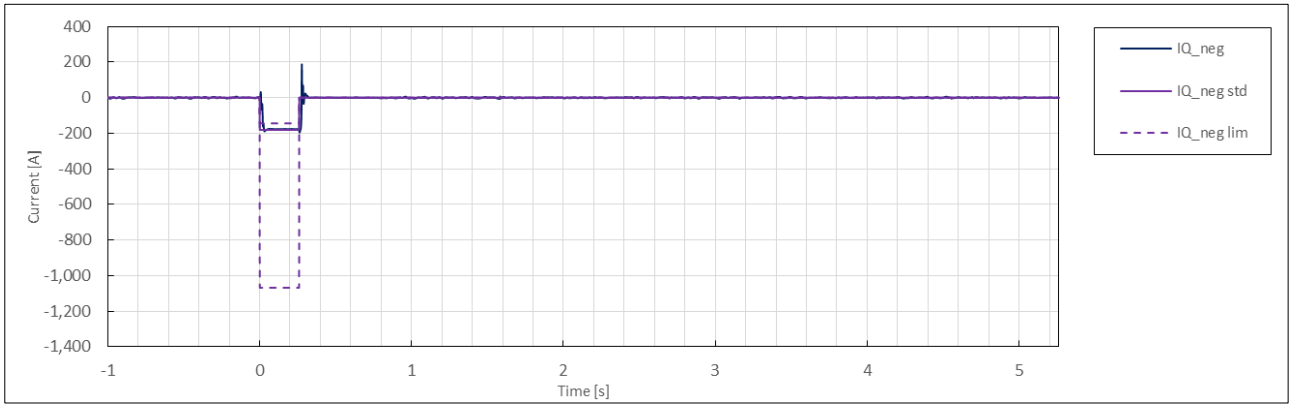

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

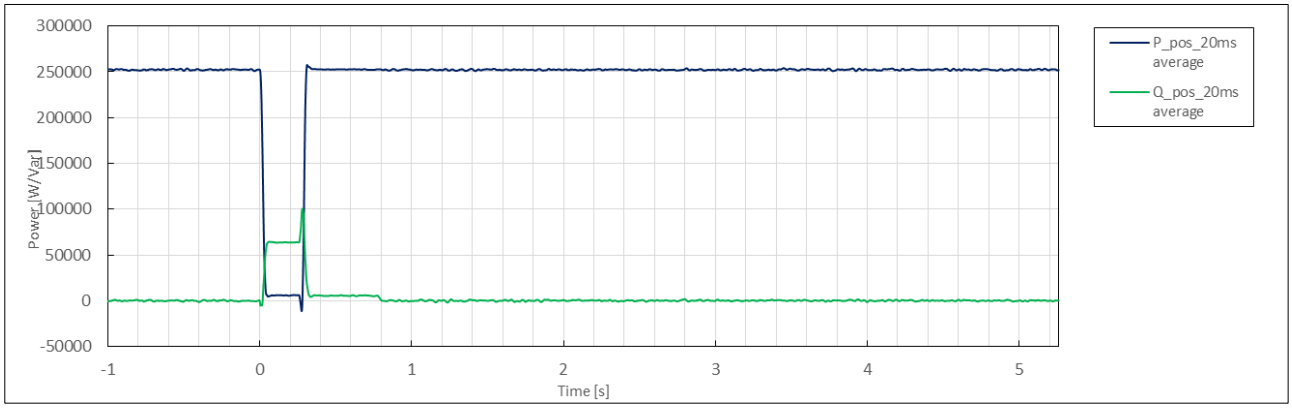

Current [A]
Time [s]
IP_pos


Current [A]
Time [s]
IP_pos
IP_posstd

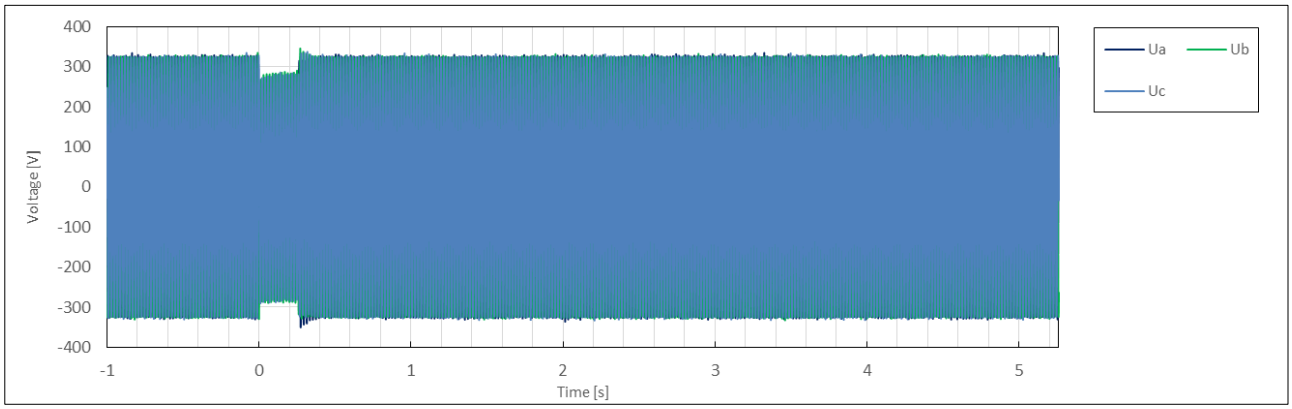

Current [A]
Time [s]
IQ_pos

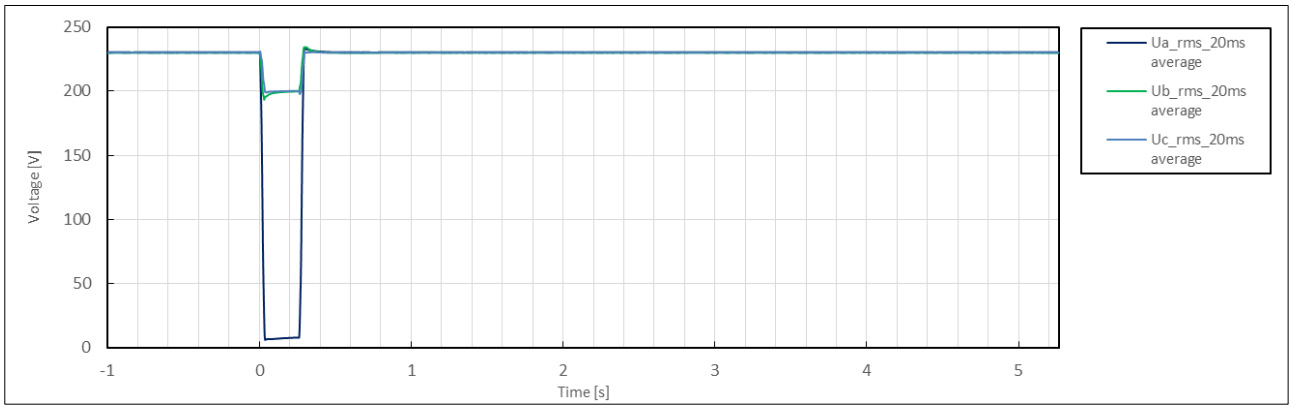

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

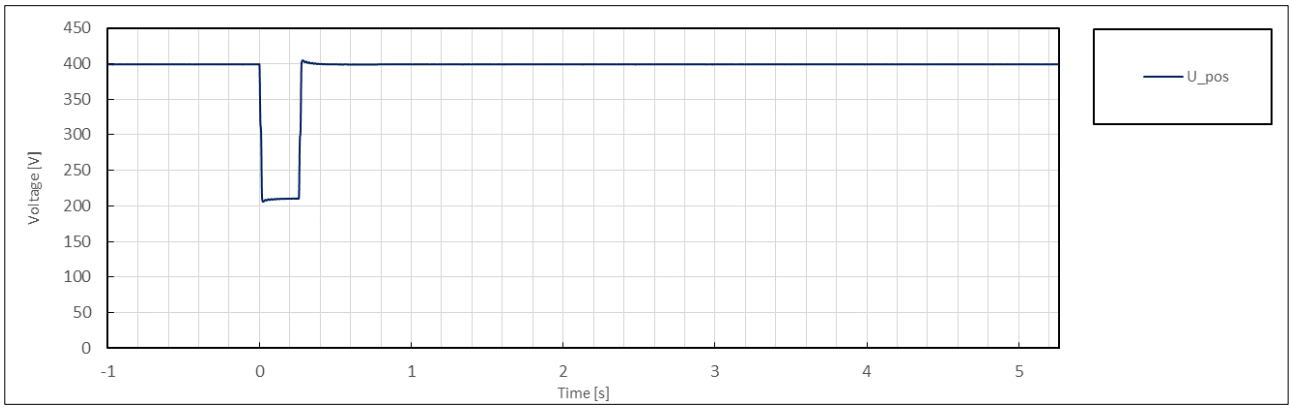

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


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

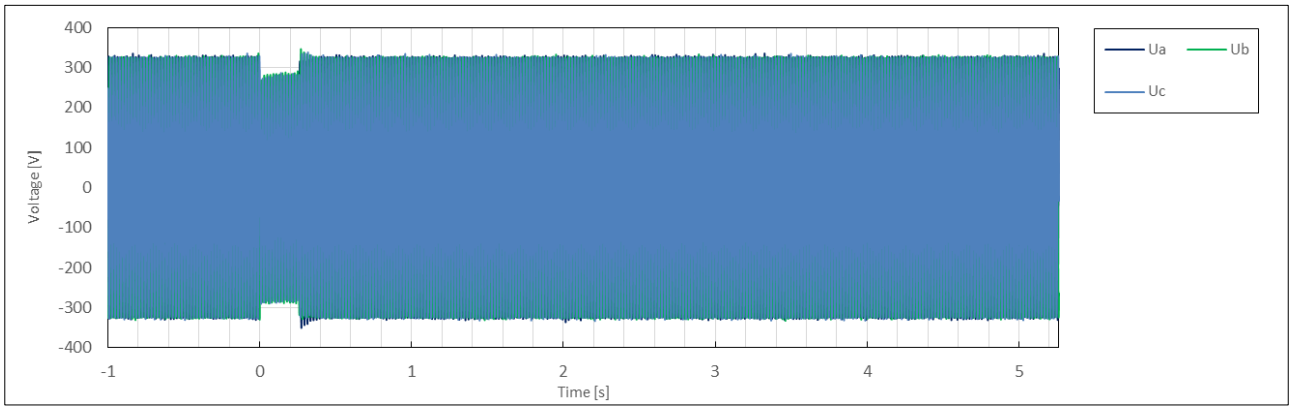
No. 1.4 Idle Test

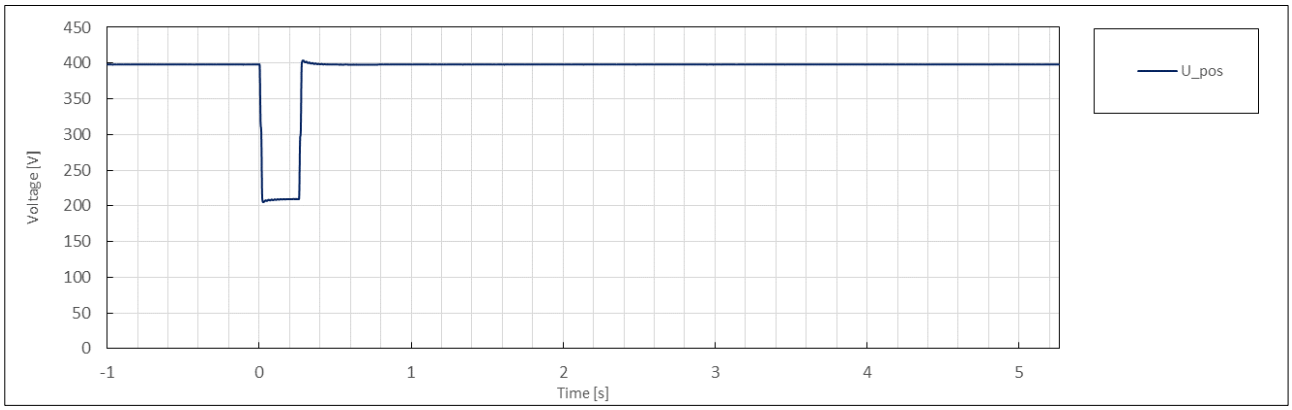


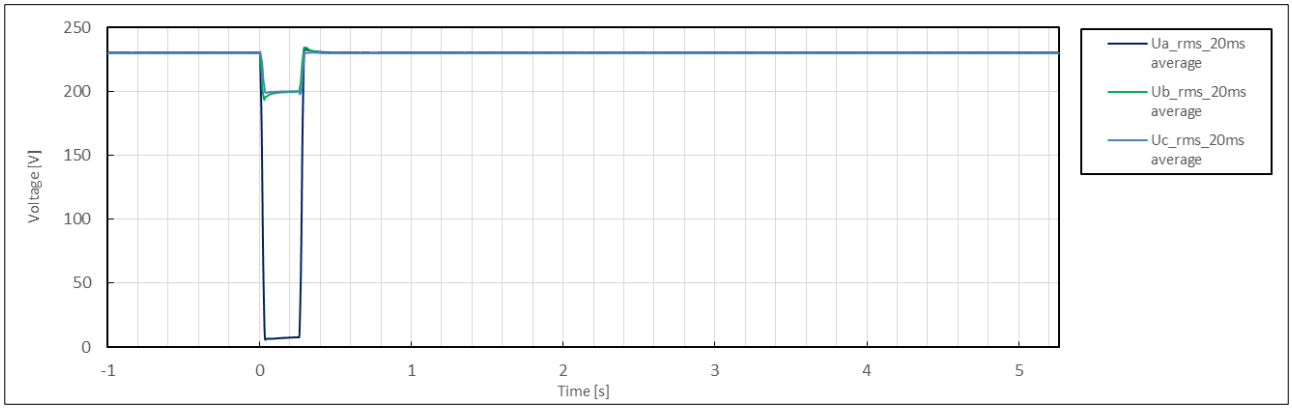


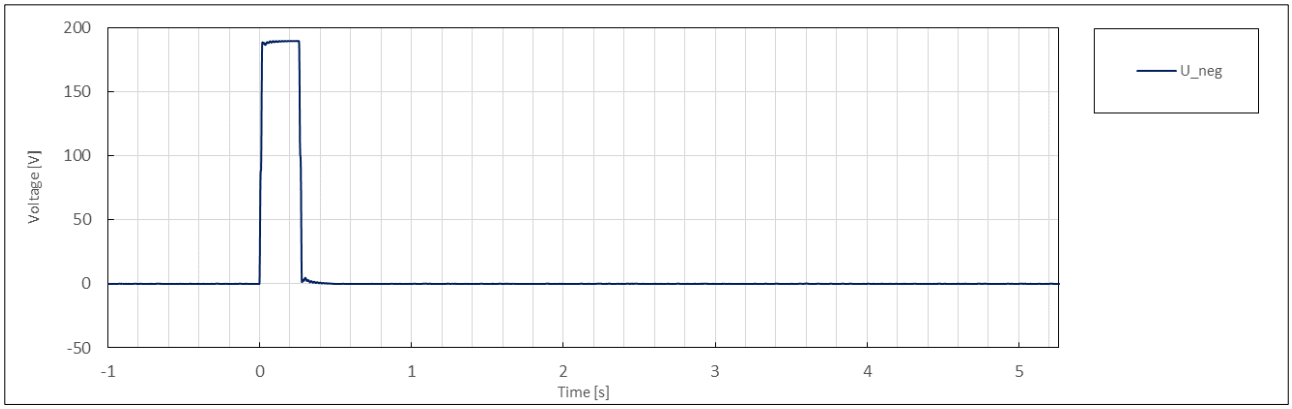


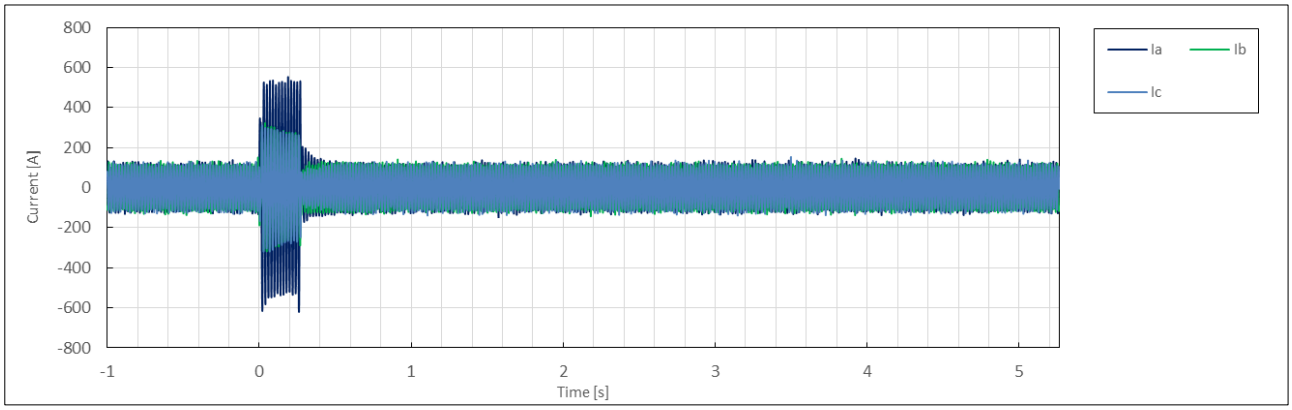
No. 1.4 Load Test

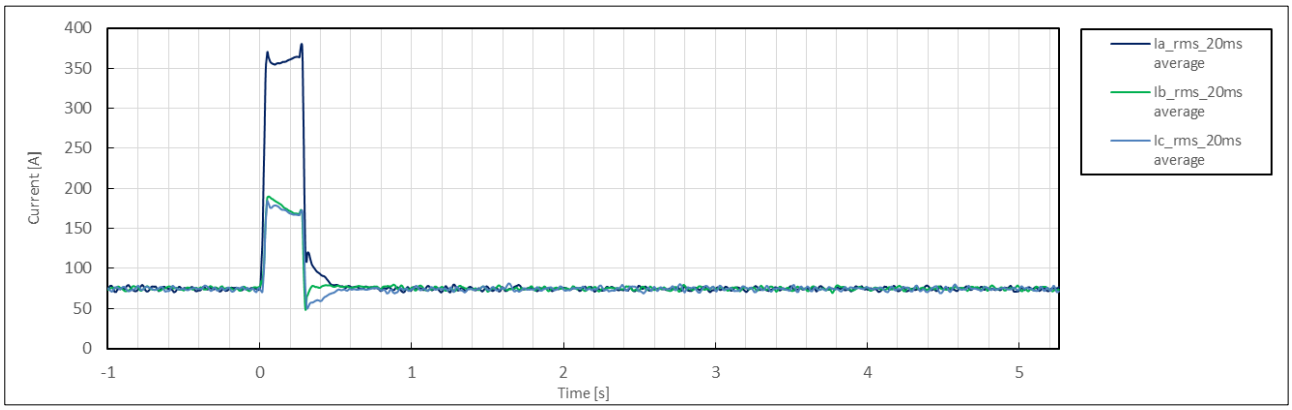


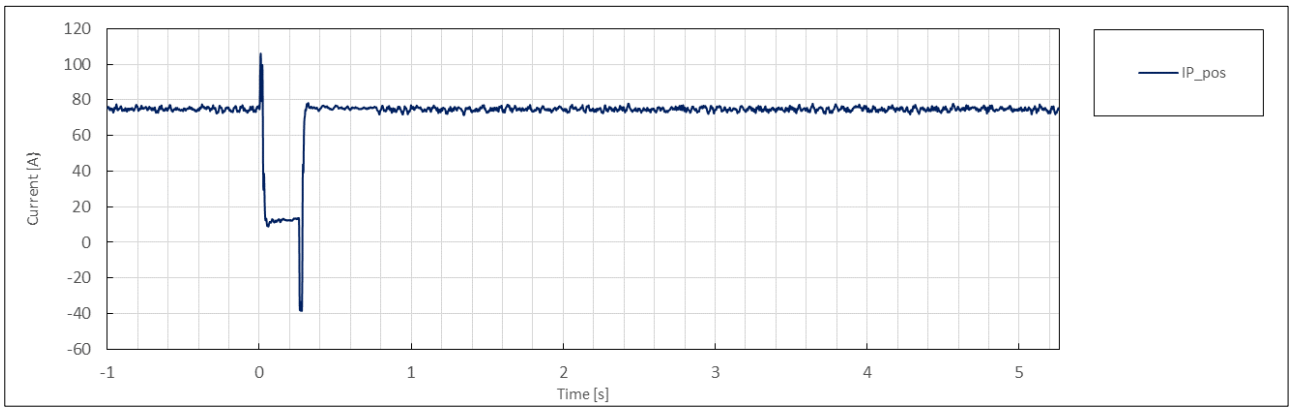


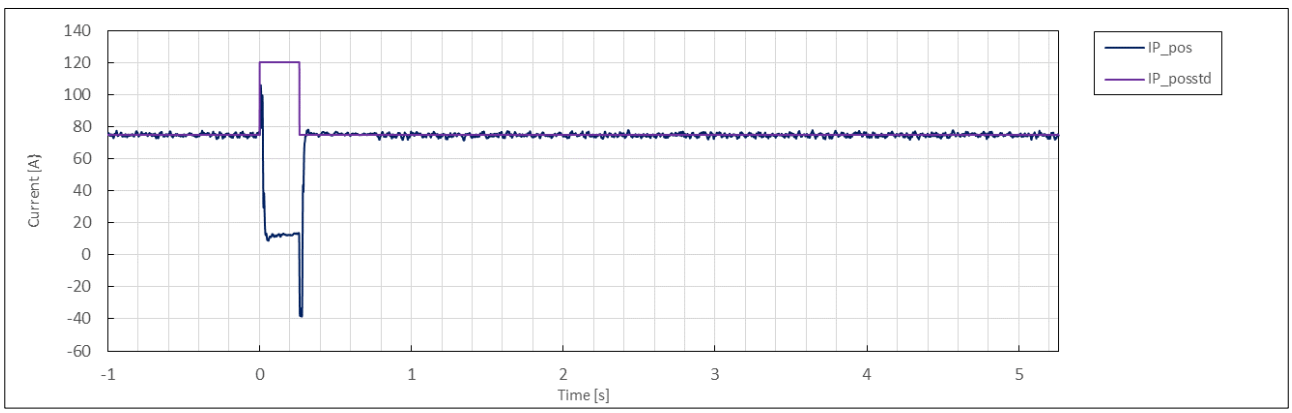


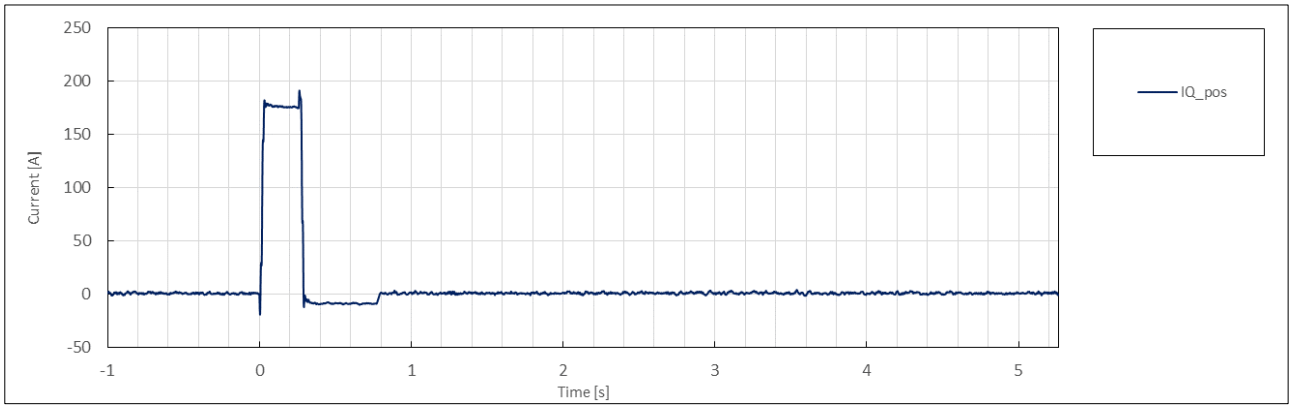


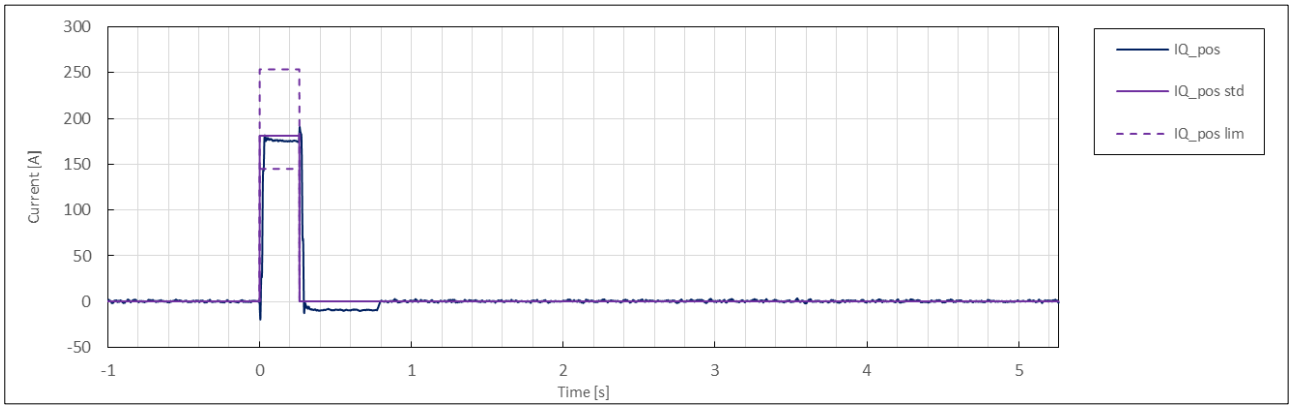

Current [A]
Time [s]
Ia
Ib
Ic

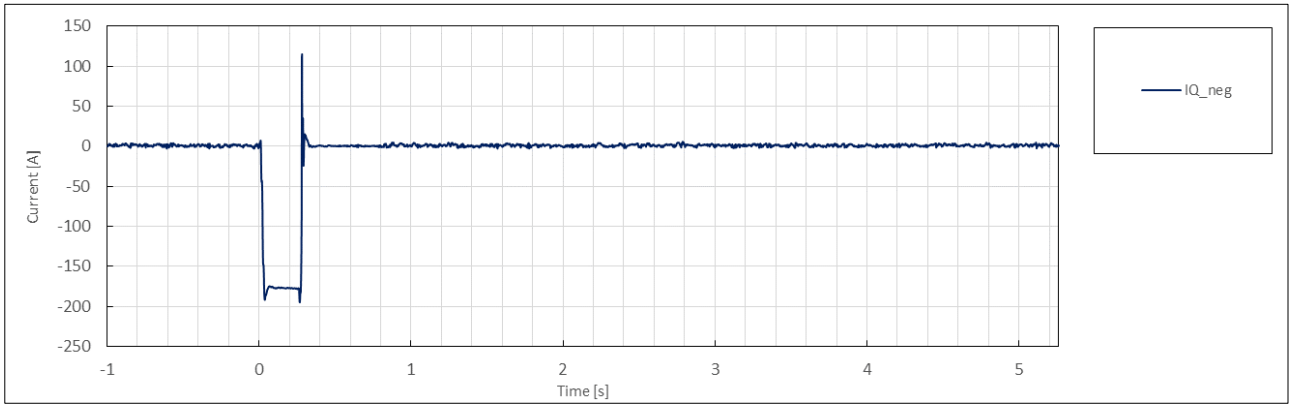

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

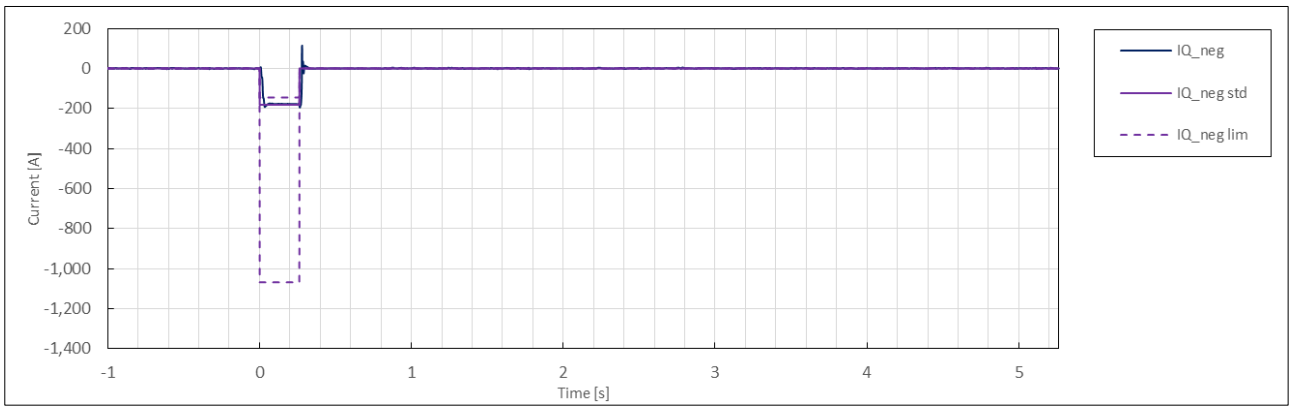

Current [A]
Time [s]
IP_pos

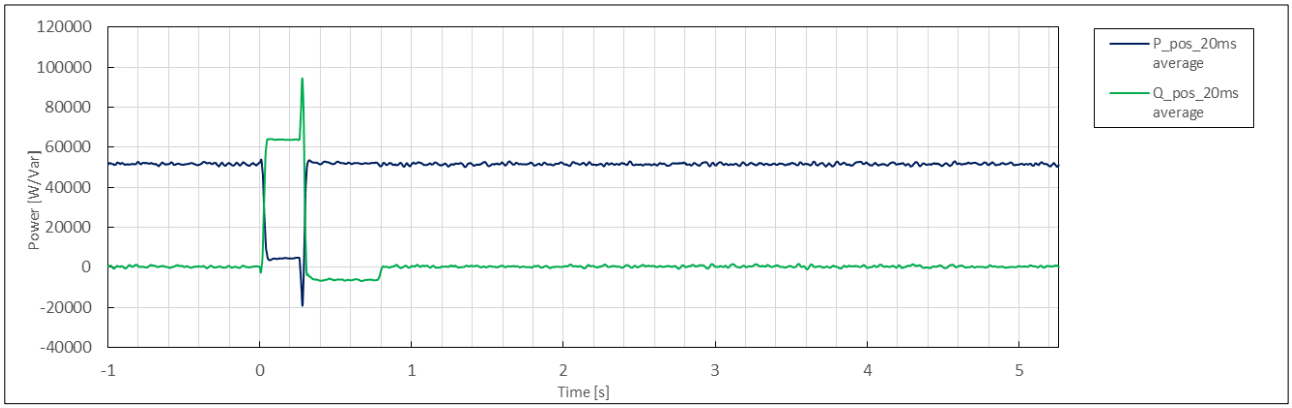

Current [A]
Time [s]
IP_pos
IP_posstd


250
200
150
100
50
0
-50
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos

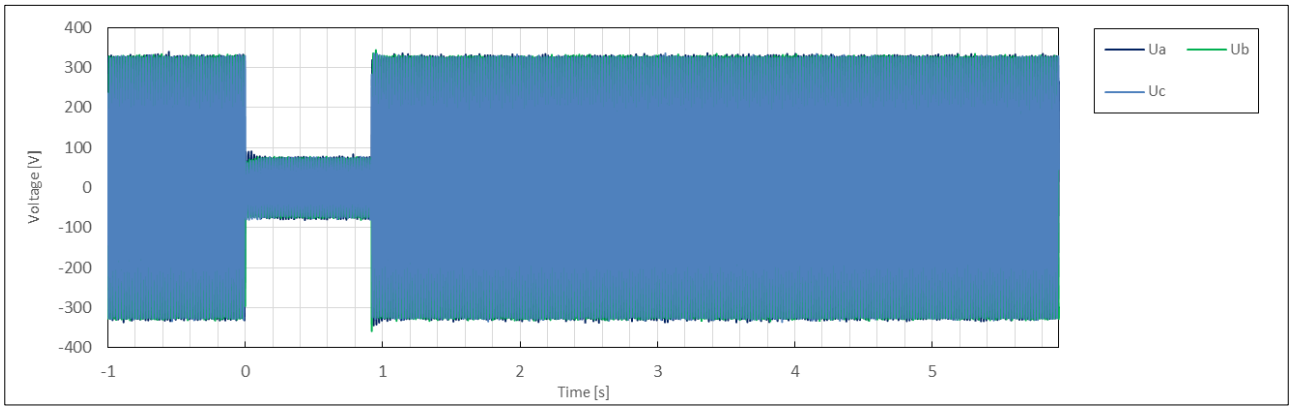

300
250
200
150
100
50
0
-50
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

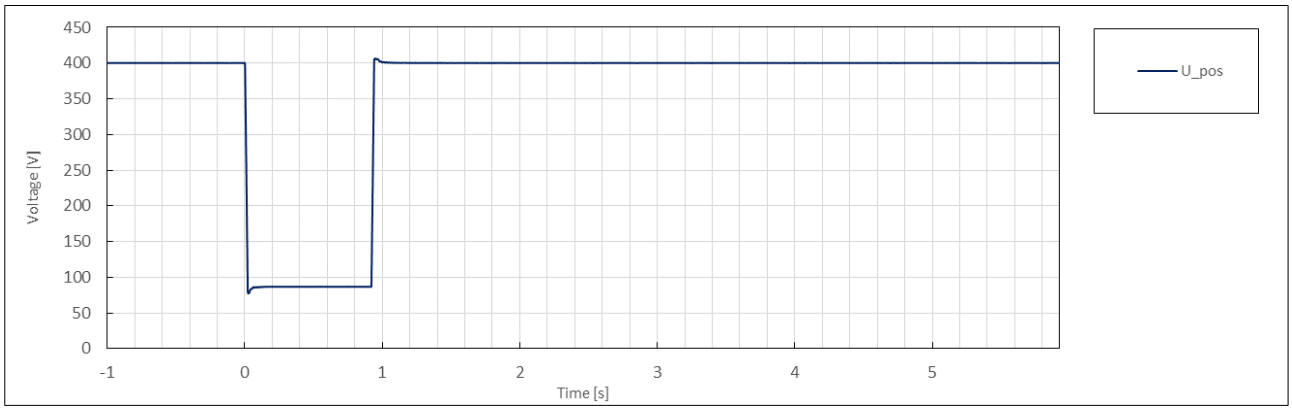

150
100
50
0
-50
-100
-150
-200
-250
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg

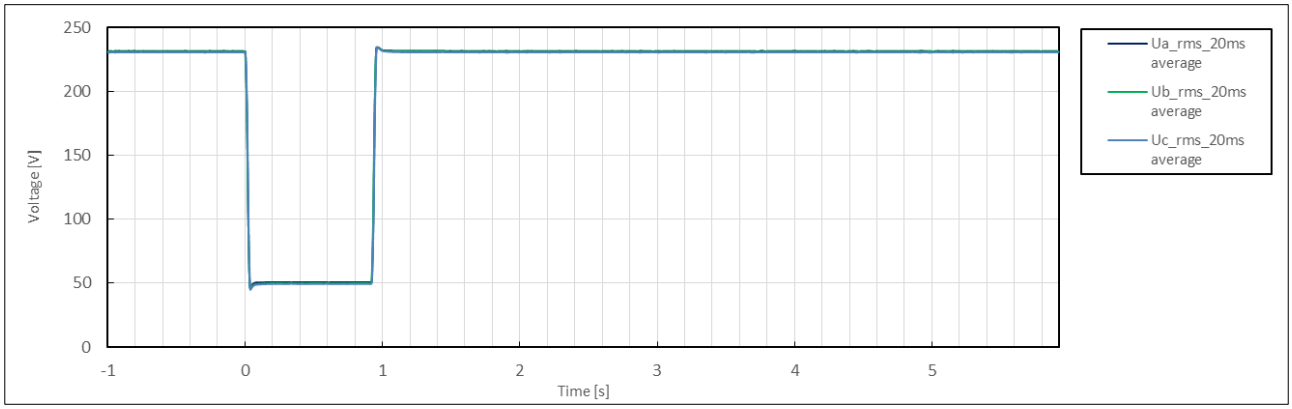

200
0
-200
-400
-600
-800
-1,000
-1,200
-1,400
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


120000
100000
80000
60000
40000
20000
0
-20000
-40000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

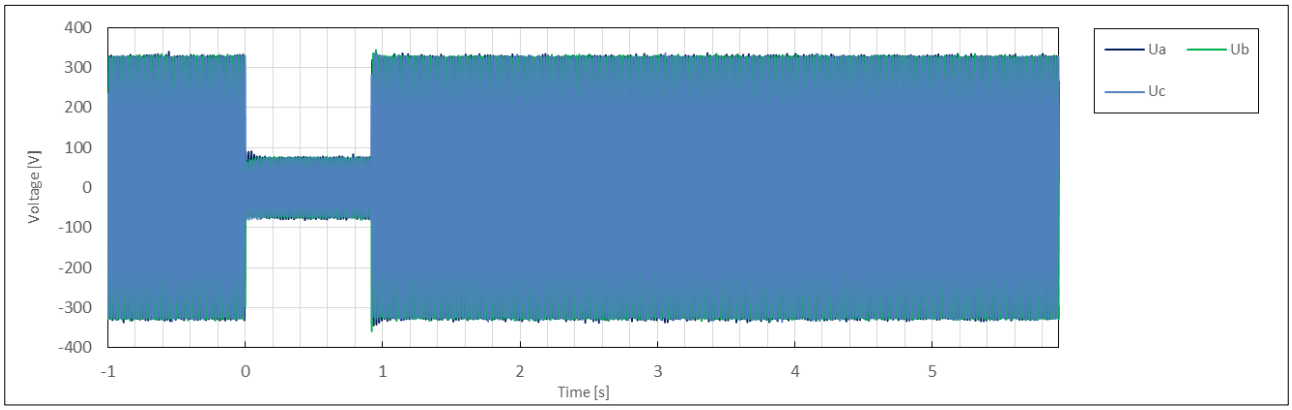
No. 2.1 Idle Test

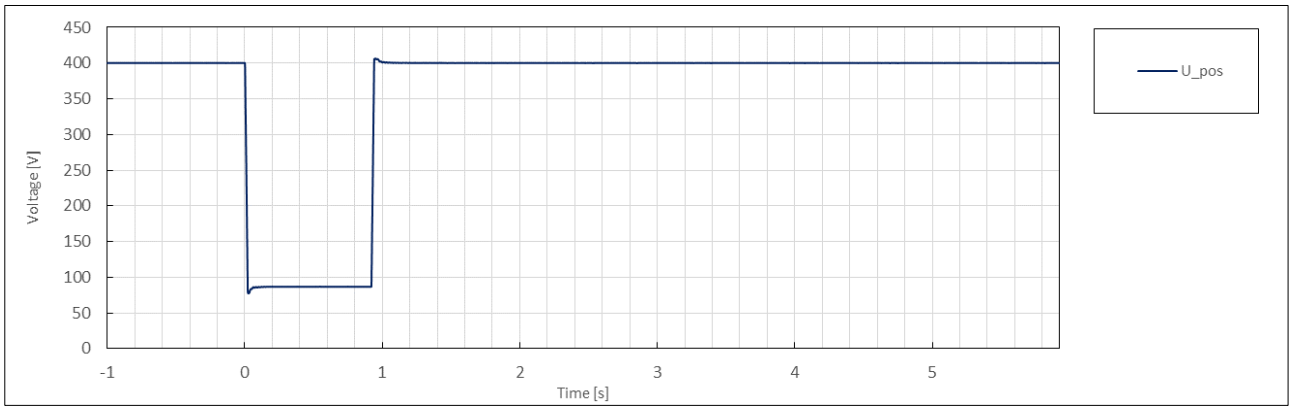


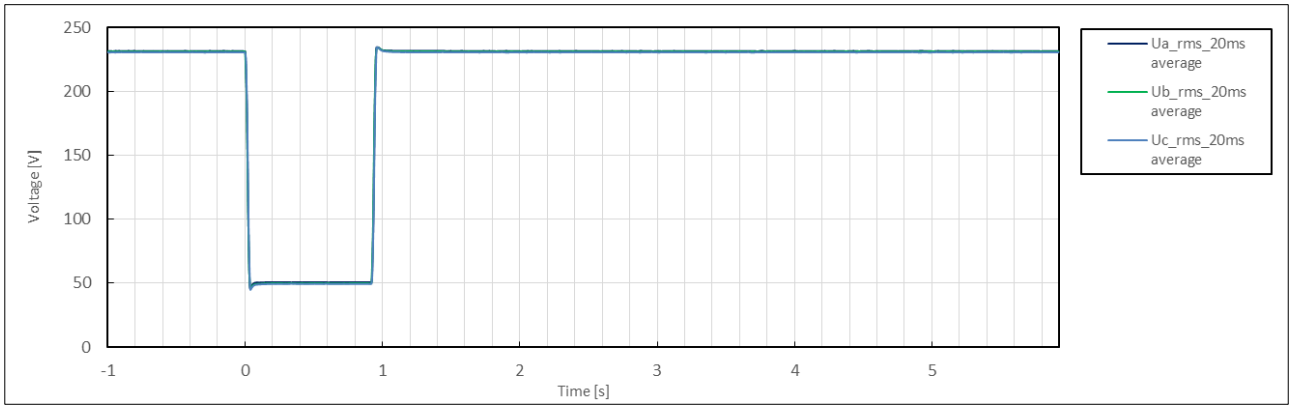


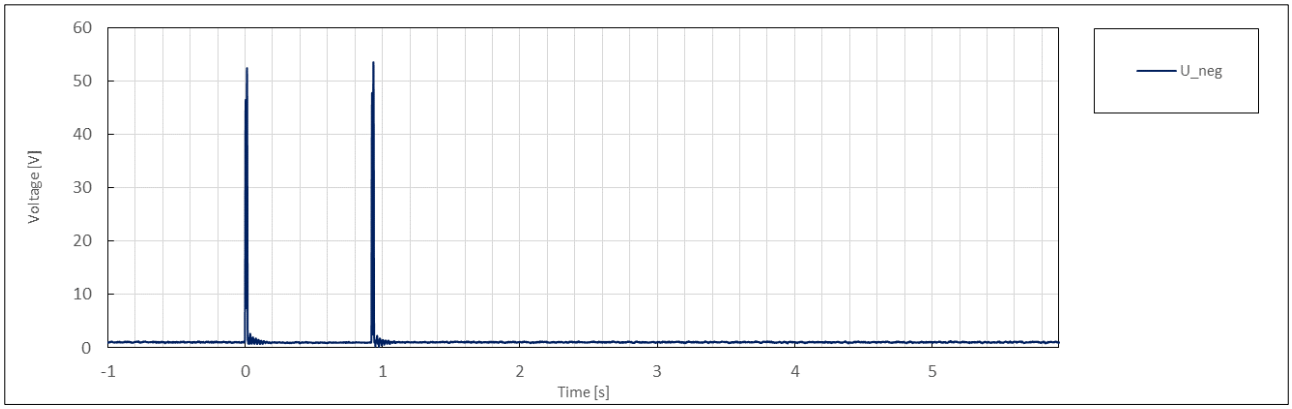


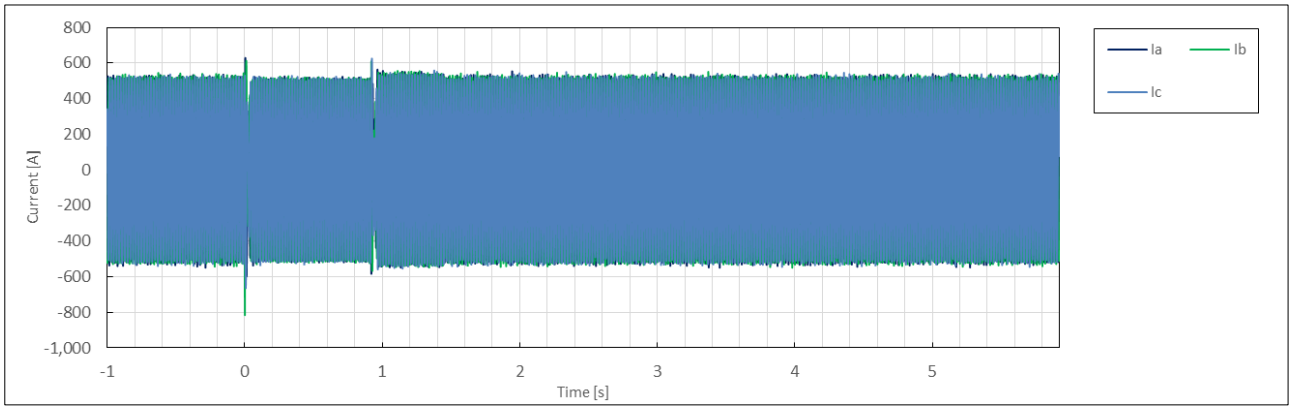
No. 2.1 Load Test

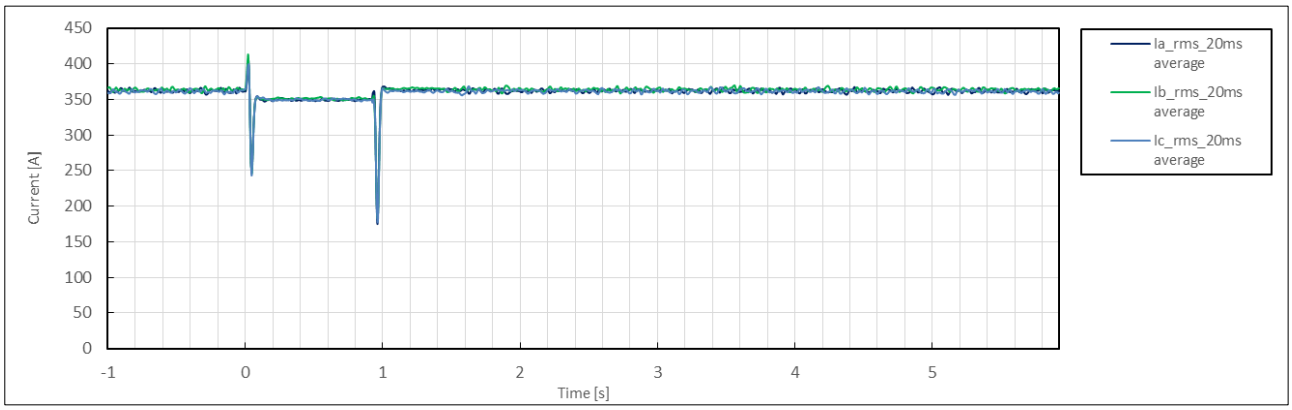


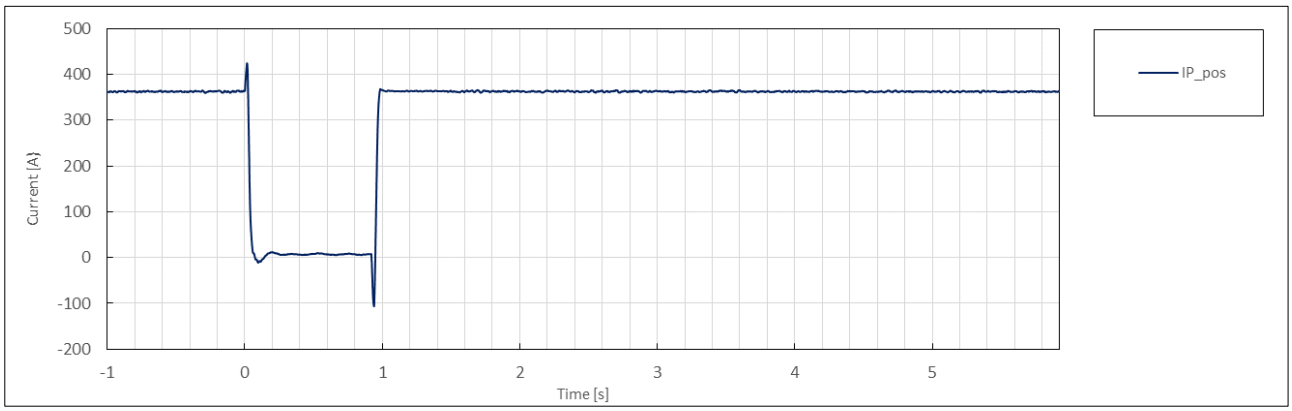


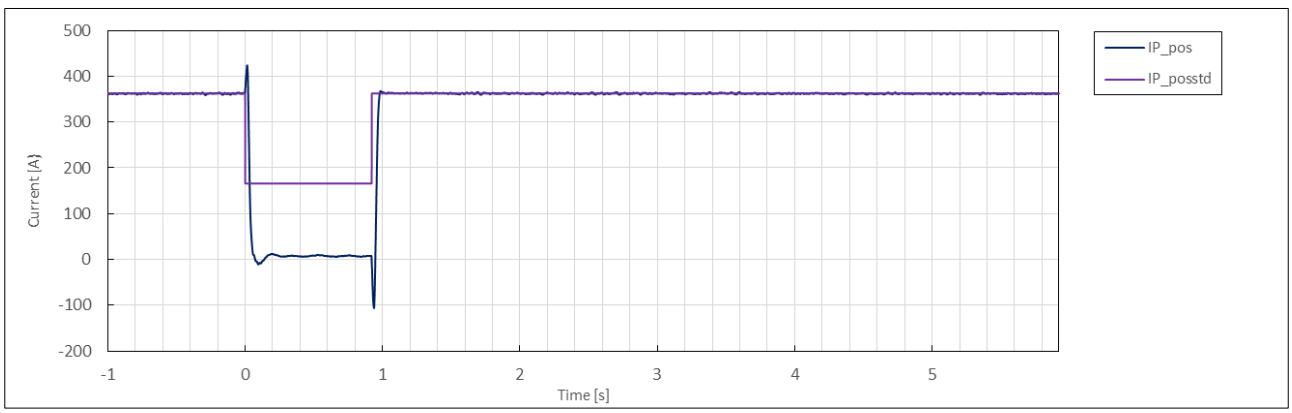


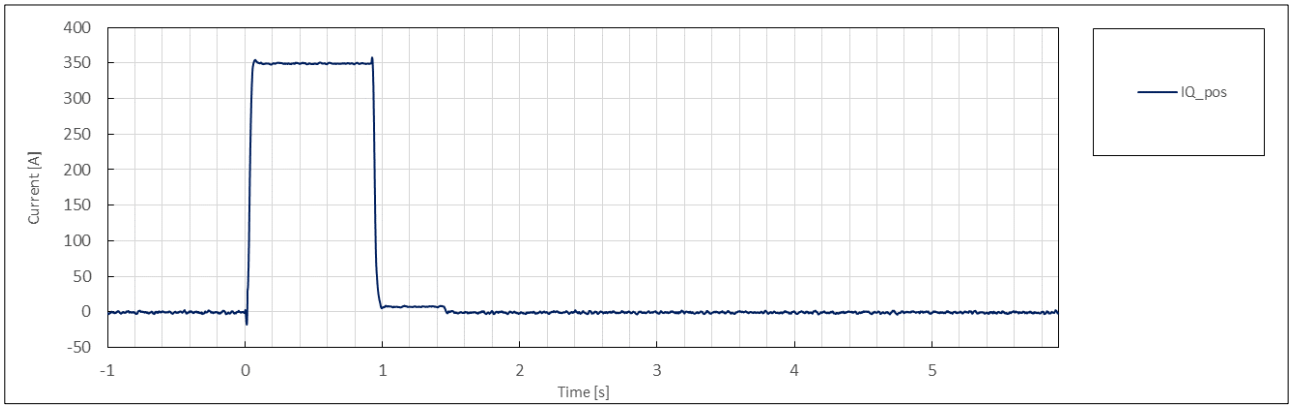


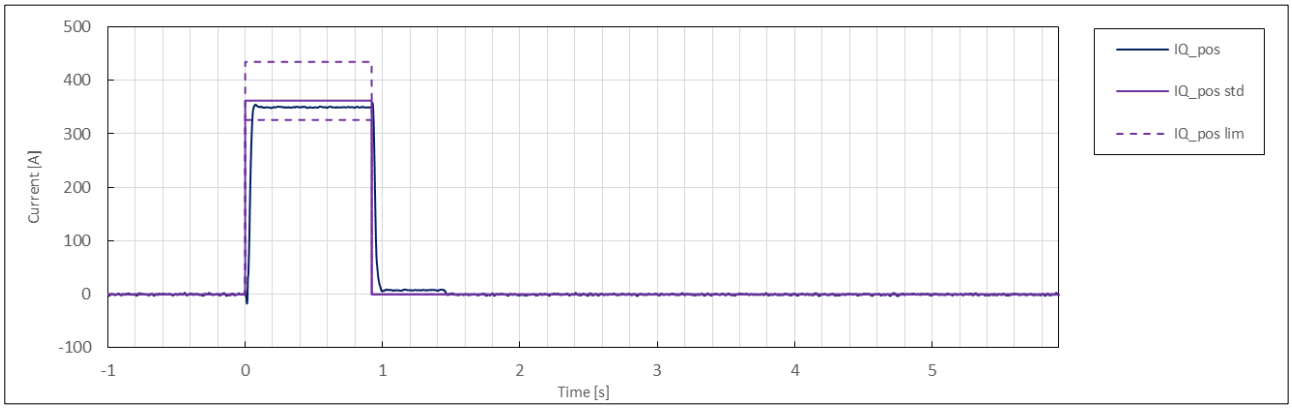

800
600
400
200
0
-200
-400
-600
-800
-1,000
Current [A]
-1
0
1
2
3
4
5
Time [s]
Ia
Ib
Ic

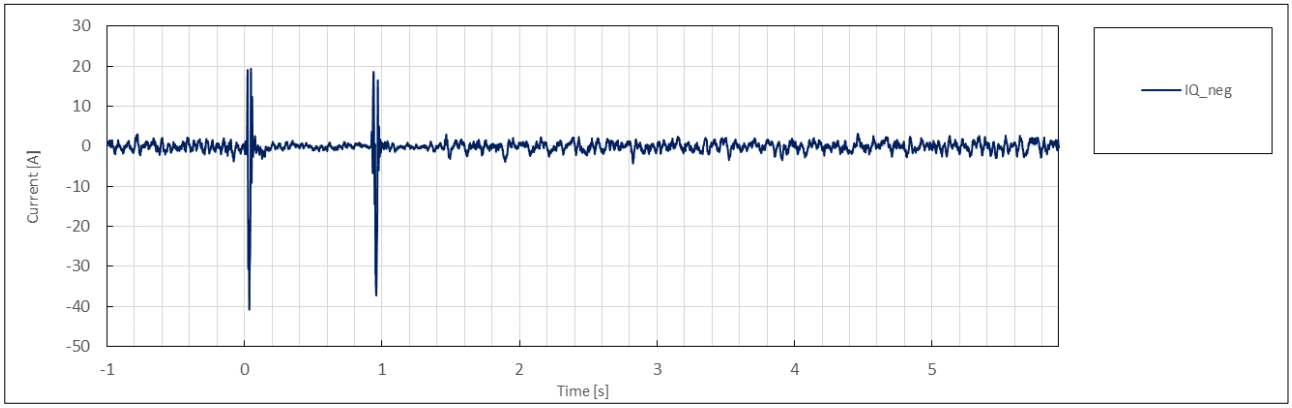

450
400
350
300
250
200
150
100
50
0
Current [A]
-1
0
1
2
3
4
5
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

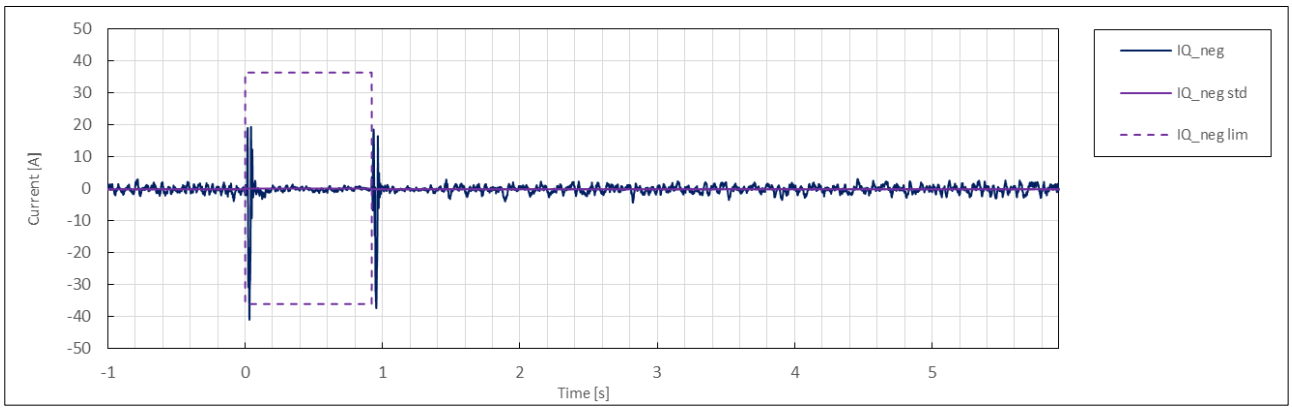

500
400
300
200
100
0
-100
-200
Current [A]
-1
0
1
2
3
4
5
Time [s]
IP_pos

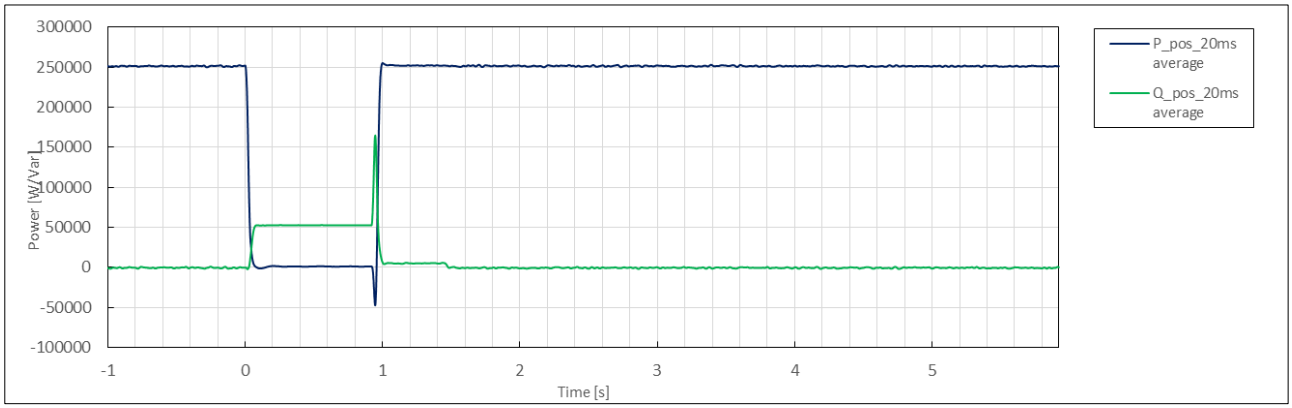

500
400
300
200
100
0
-100
-200
Current [A]
-1
0
1
2
3
4
5
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

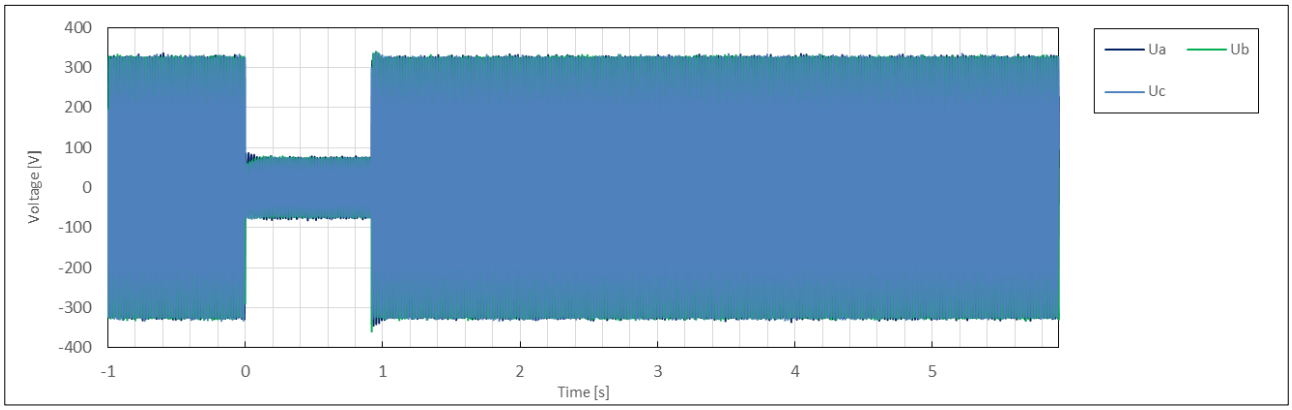

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

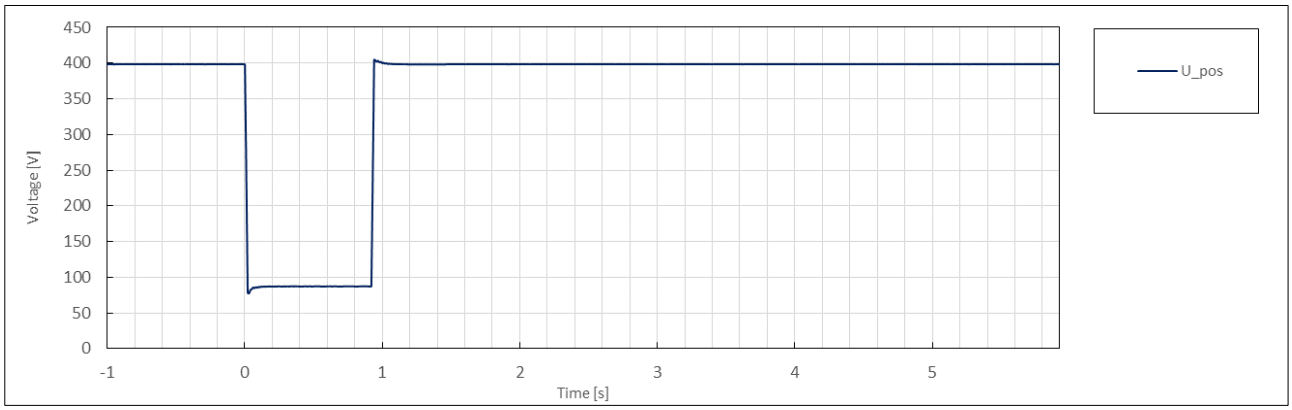

Current [A]
Time [s]
IQ_neg

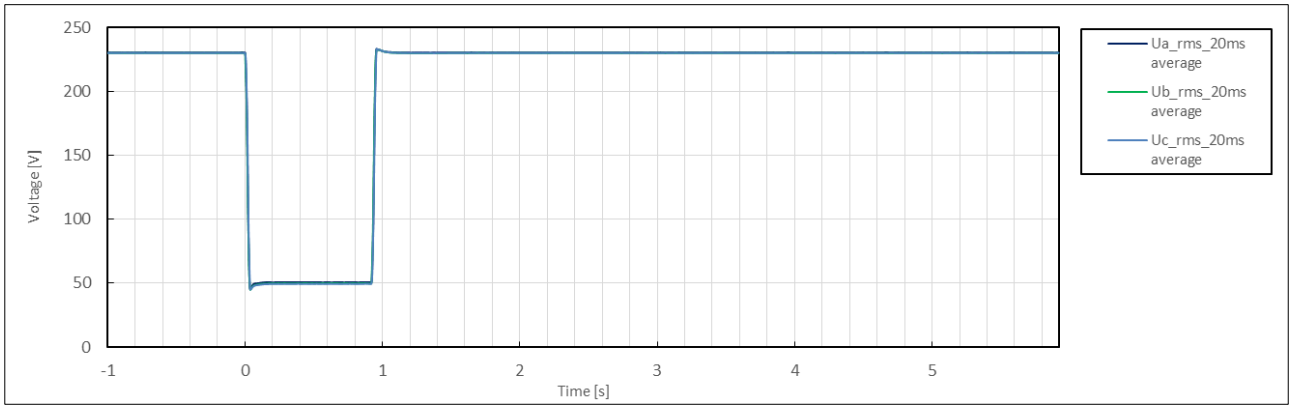

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

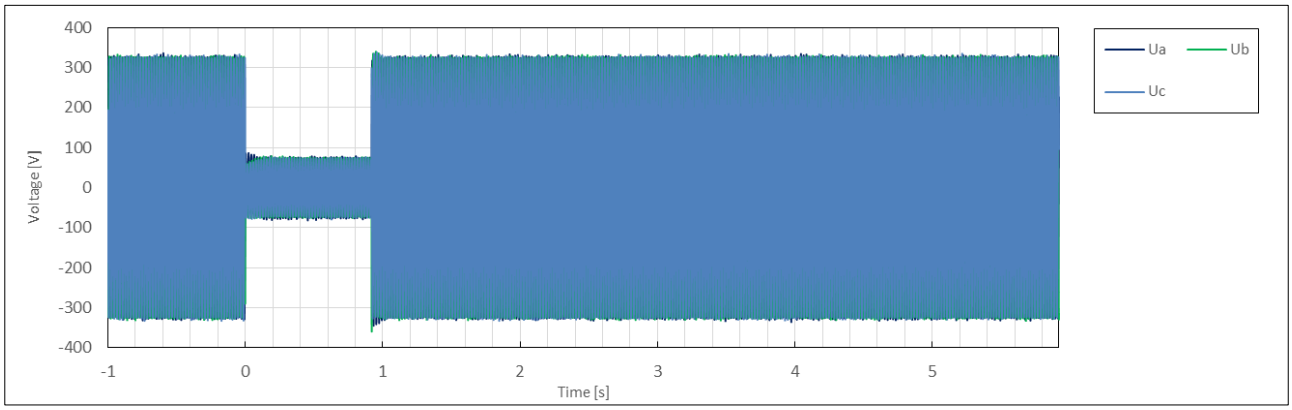
No.2.2 Idle Test

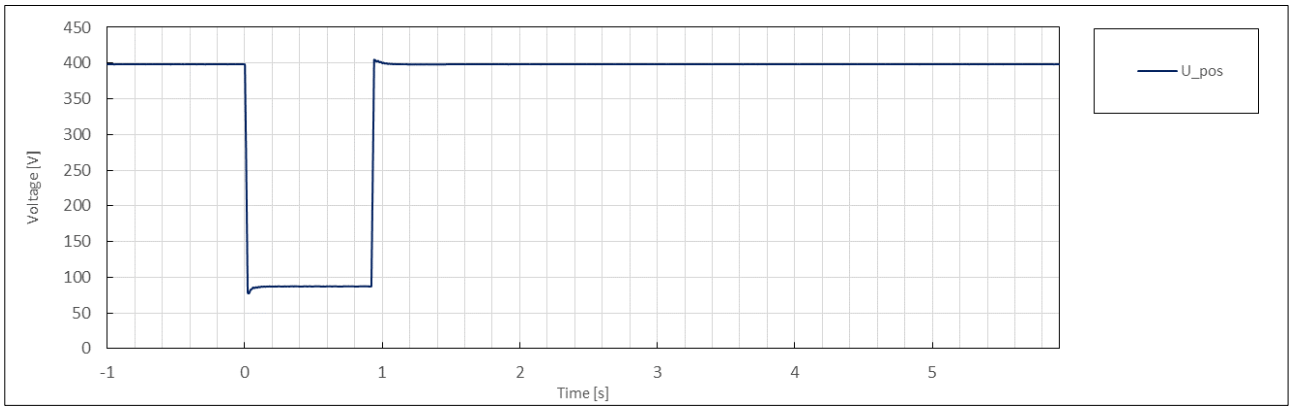


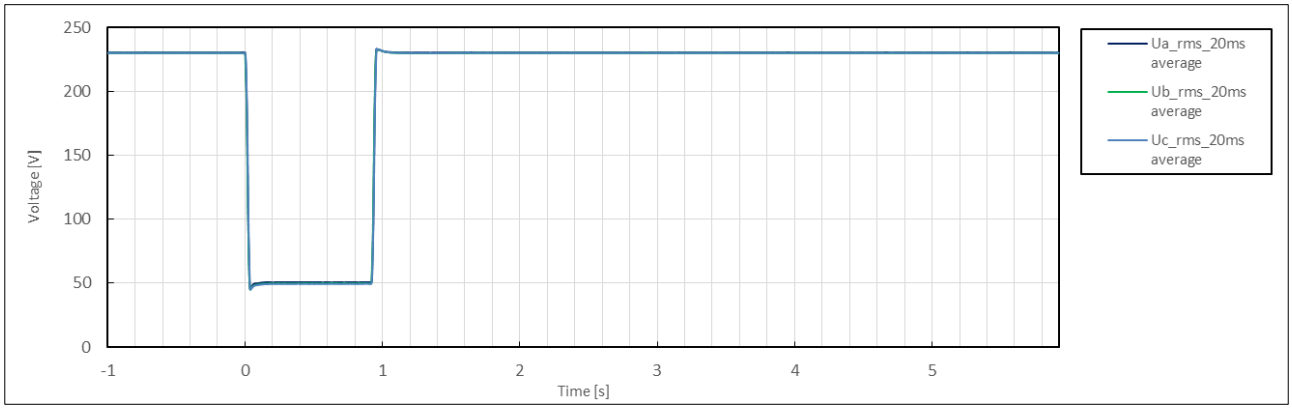


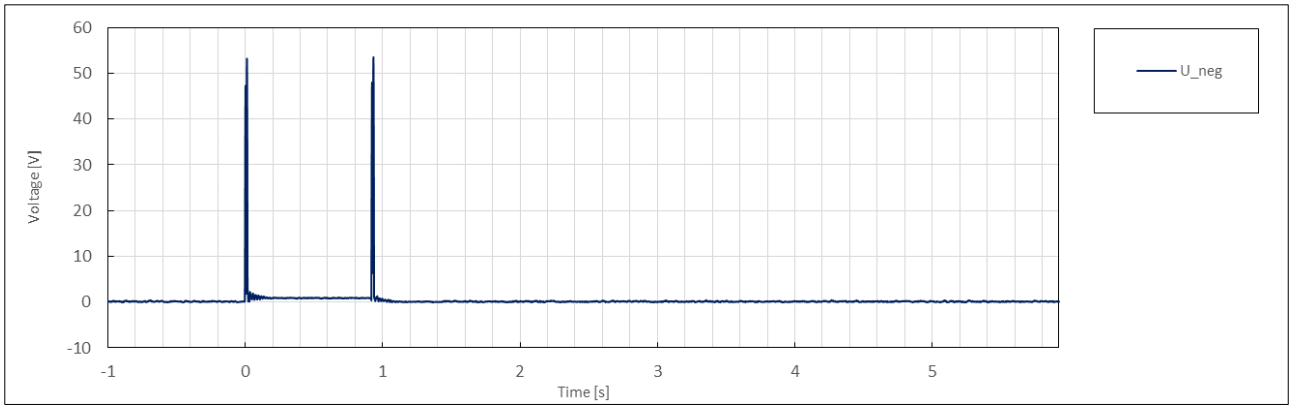


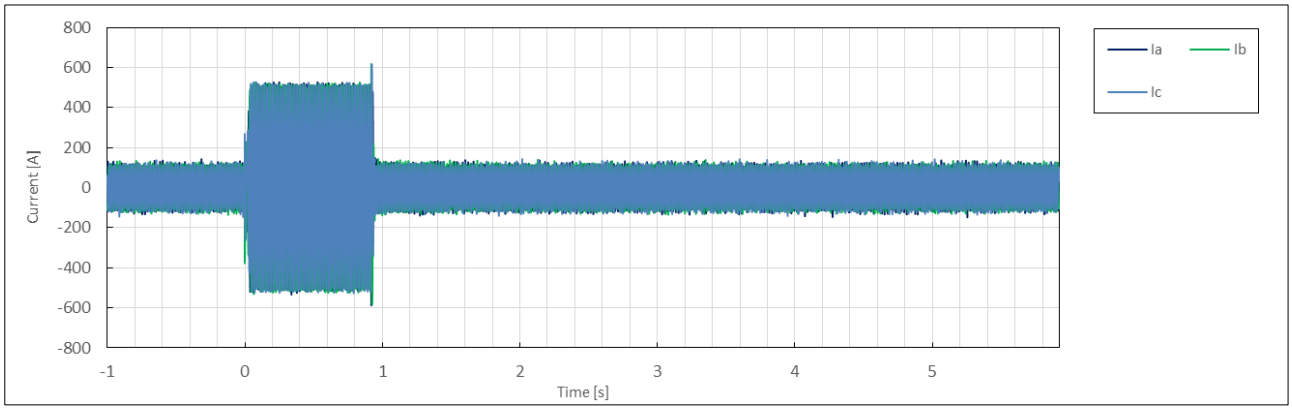
No. 2.2 Load Test

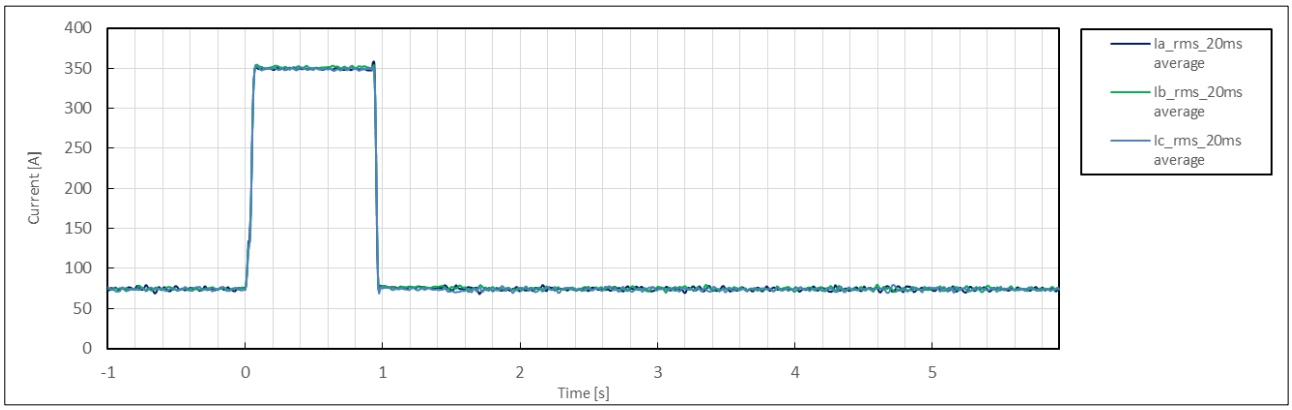


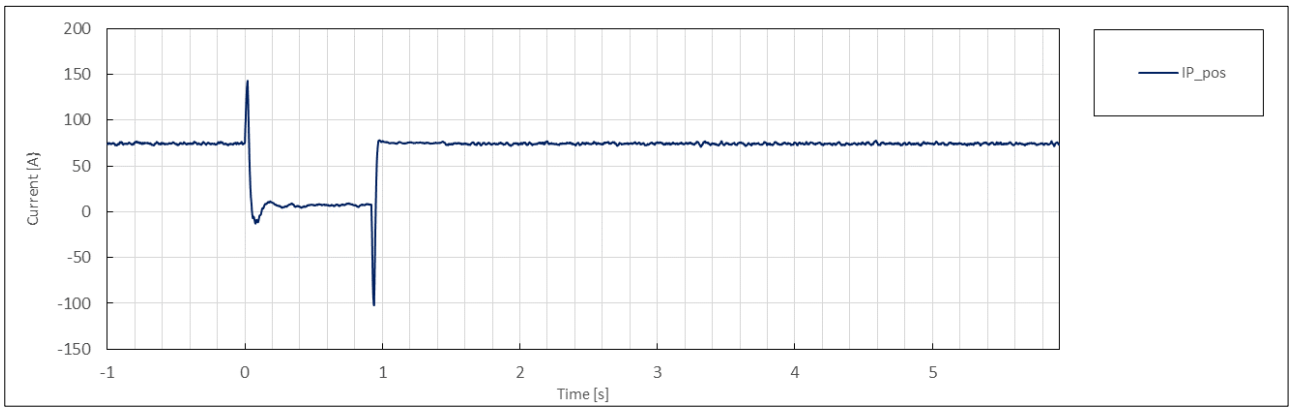


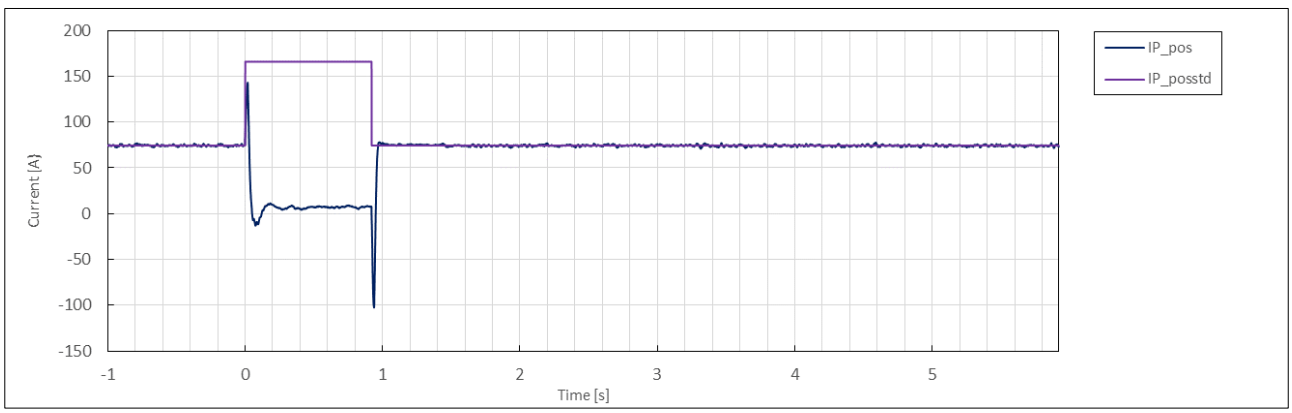


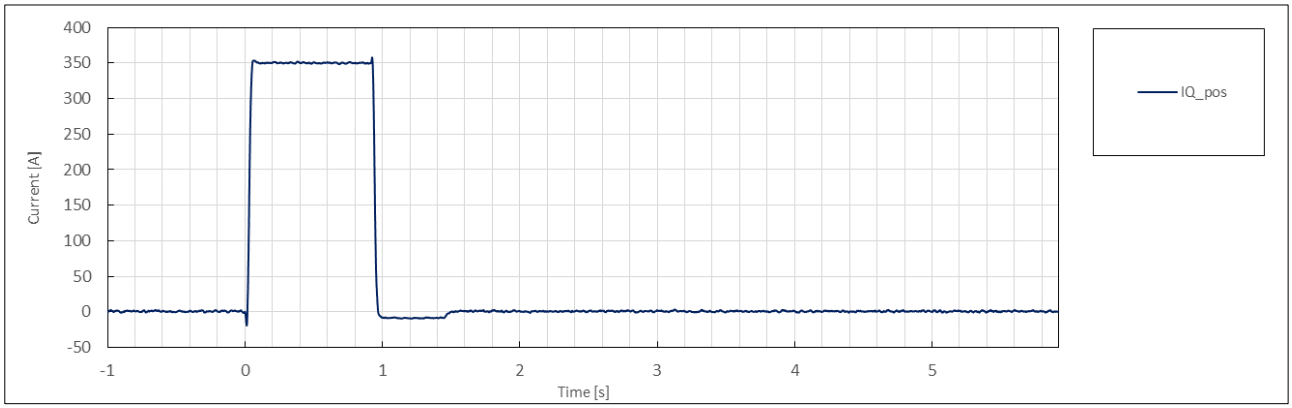


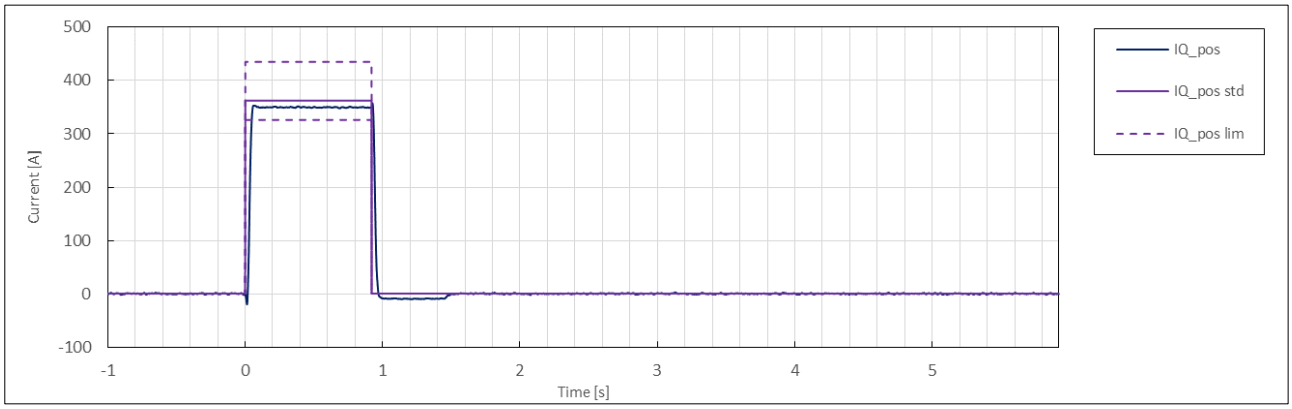

Current [A]
Time [s]
Ia
Ib
Ic

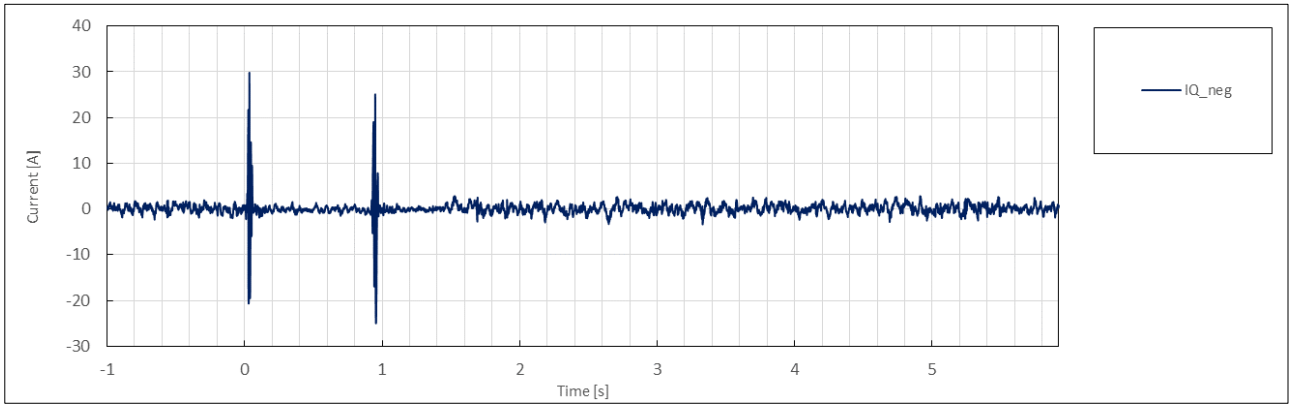

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

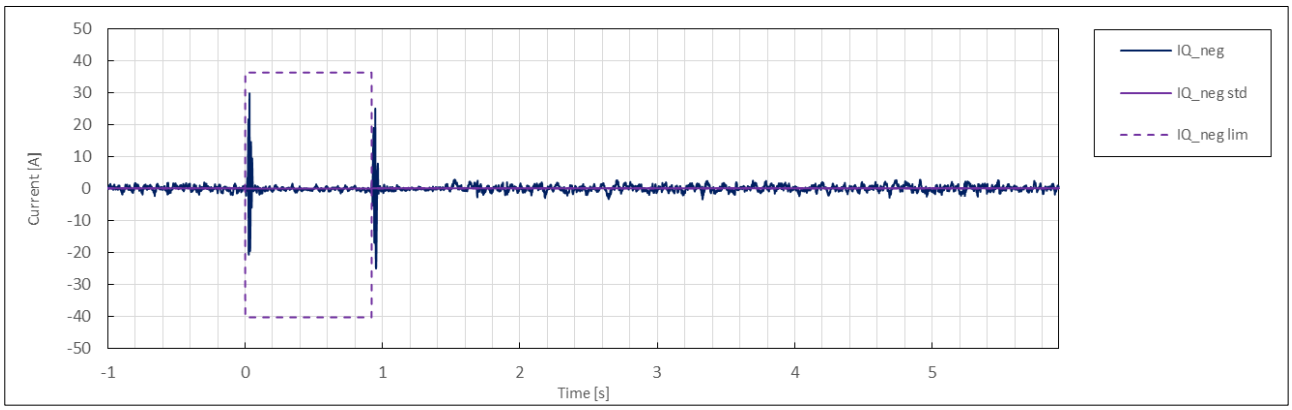

Current [A]
Time [s]
IP_pos

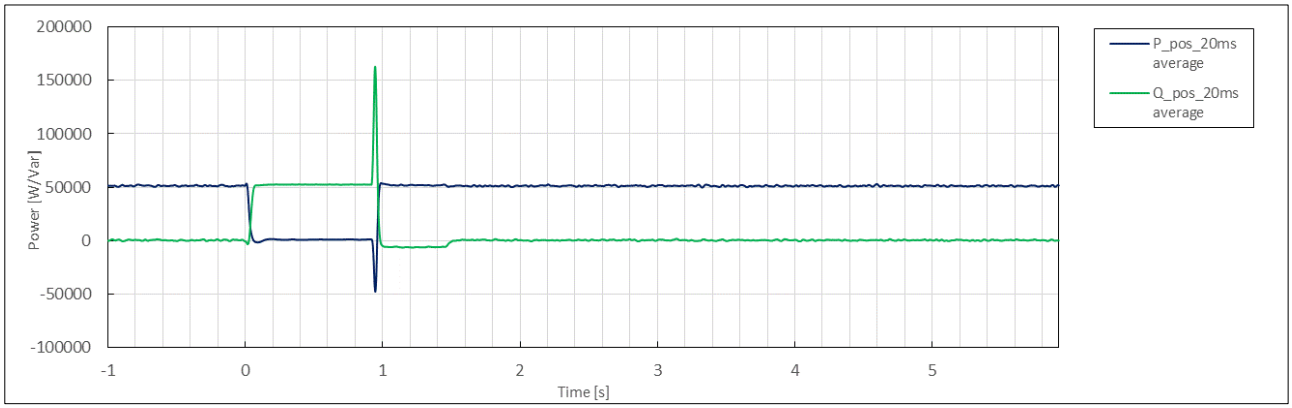

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

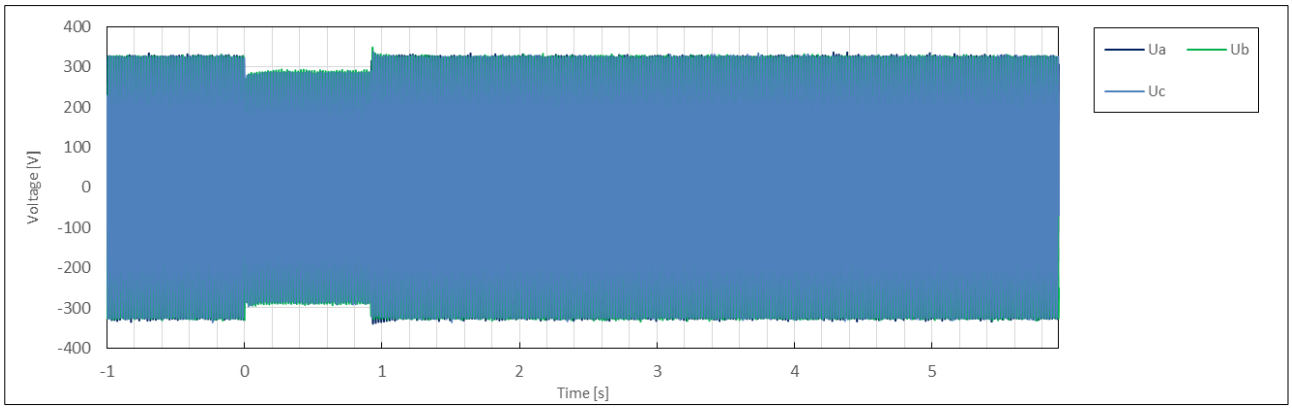

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

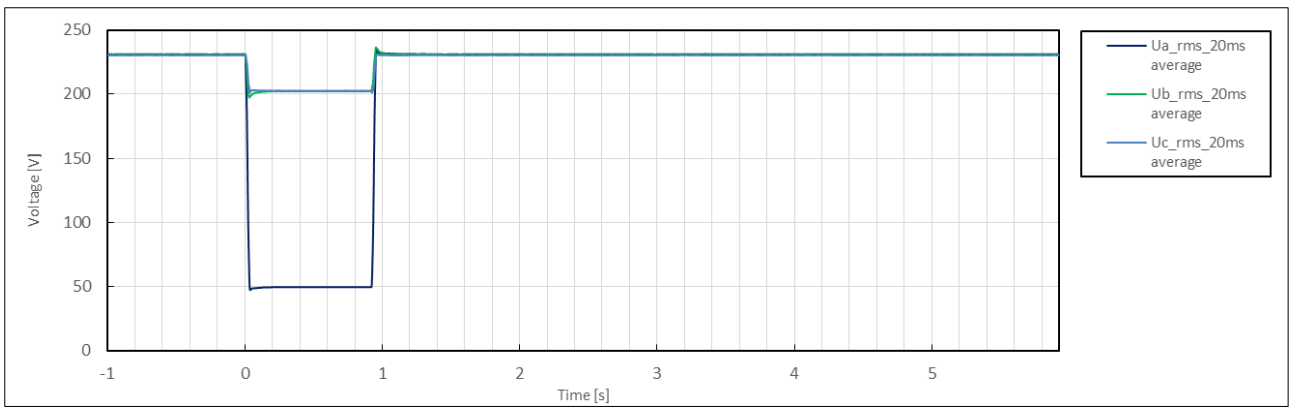

Current [A]
Time [s]
IQ_neg

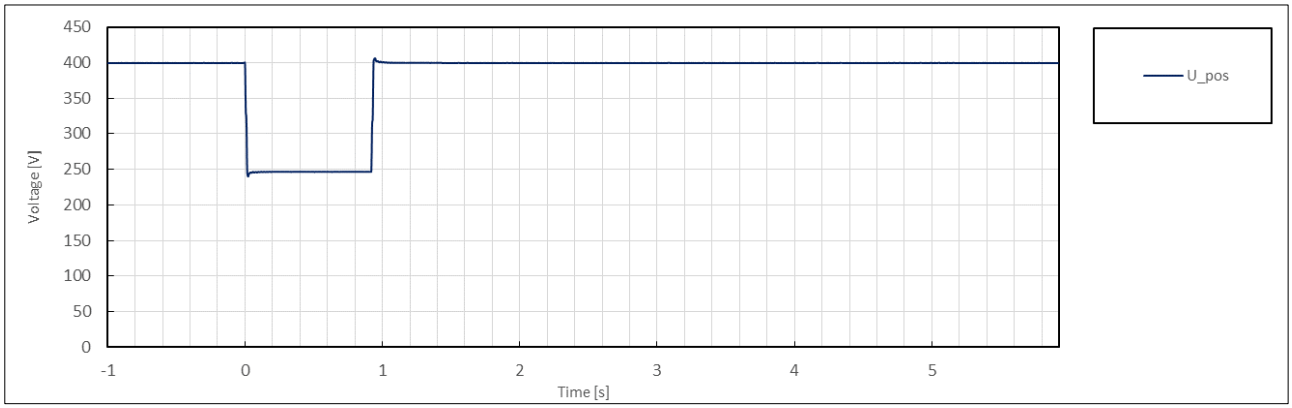

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim



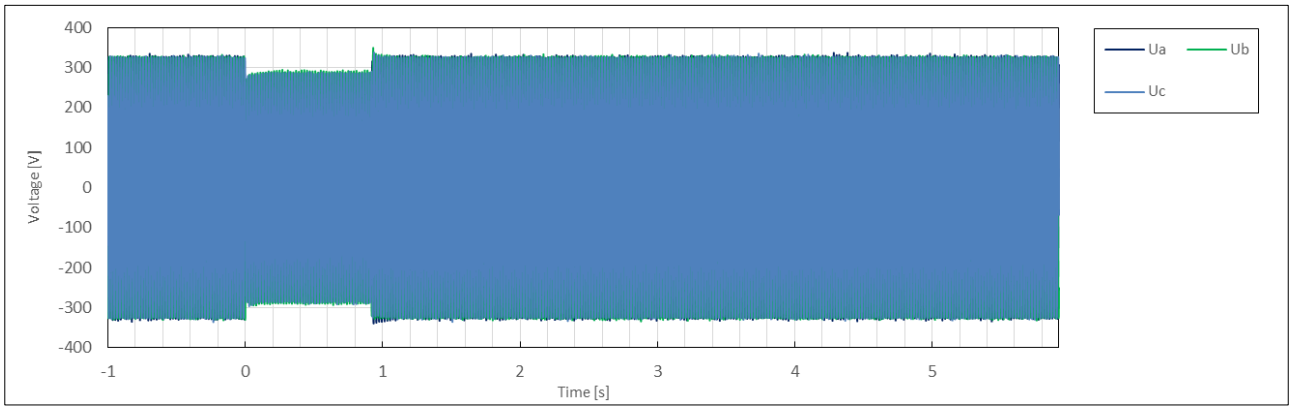
No. 2.3 Idle Test

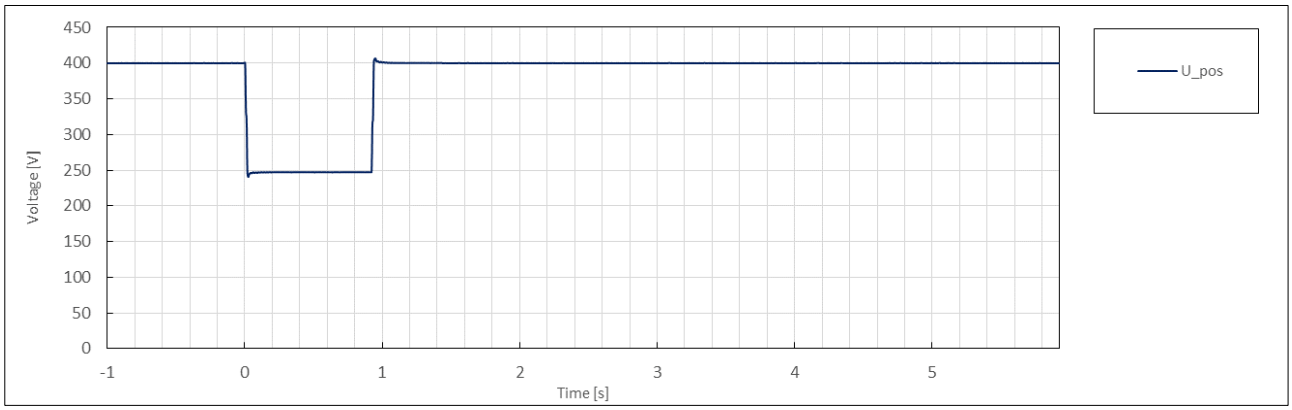


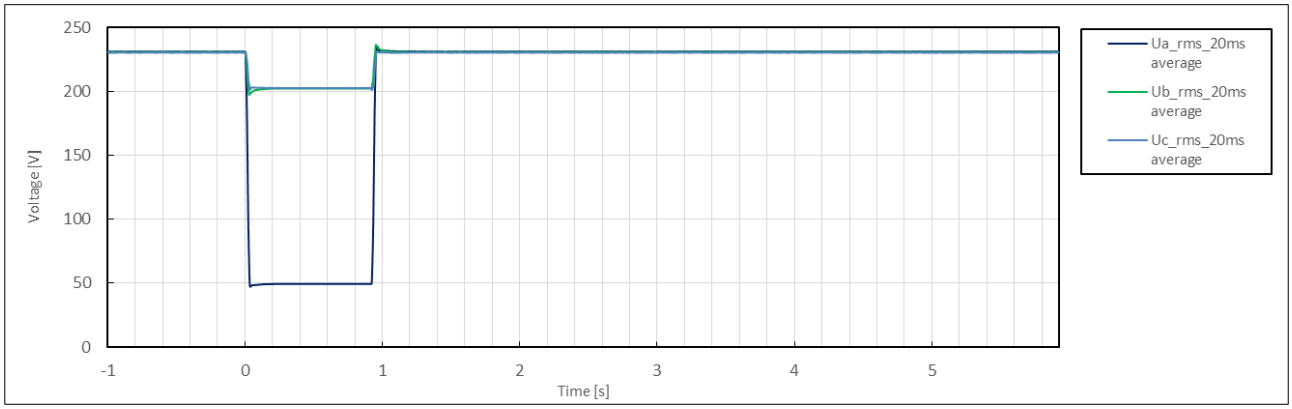


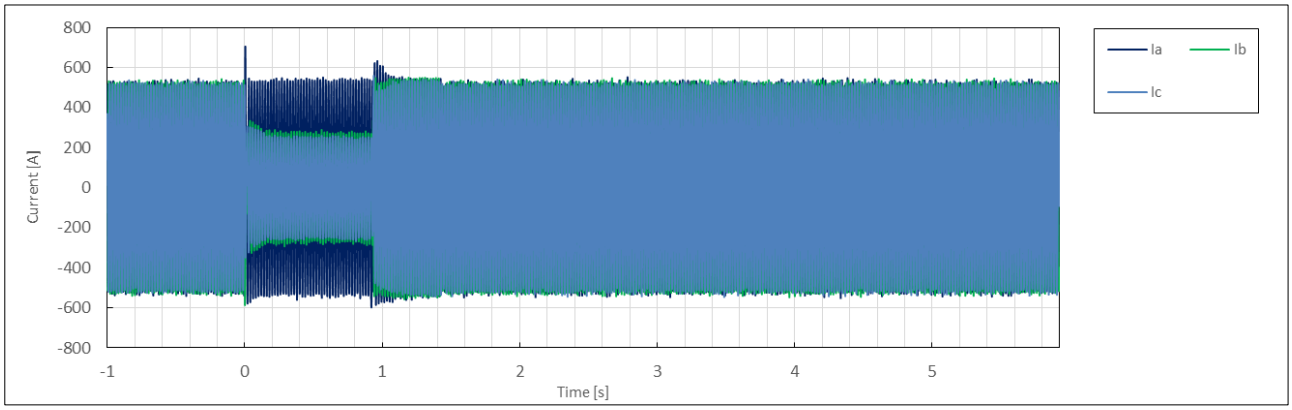

450
400
350
300
250
200
150
100
50
0
Voltage [V]
-1
0
1
2
3
4
5
Time [s]
U_pos

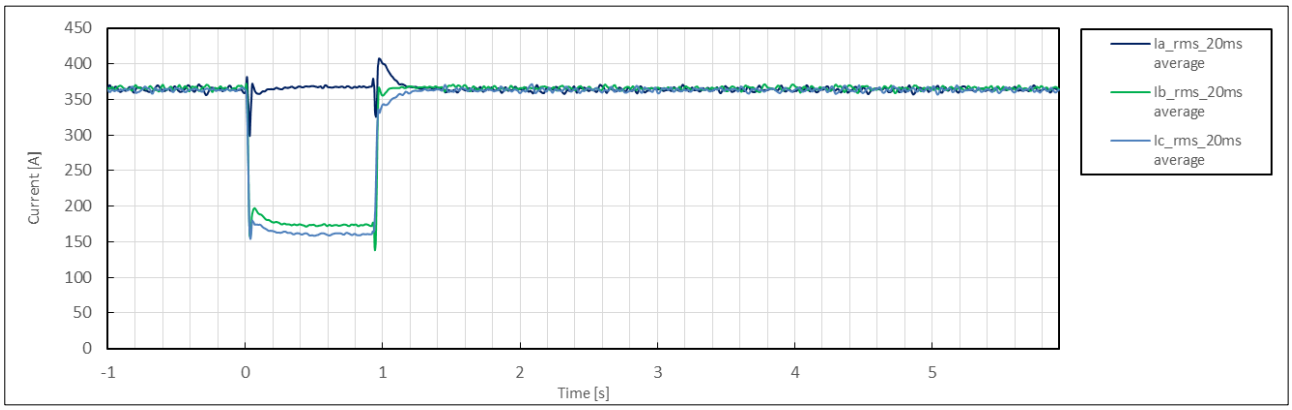
No. 2.3 Load Test

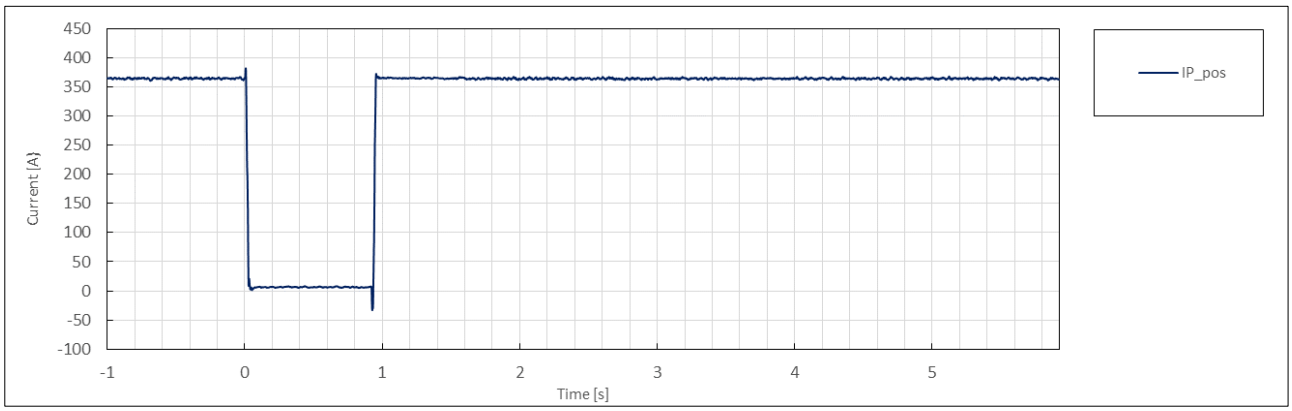


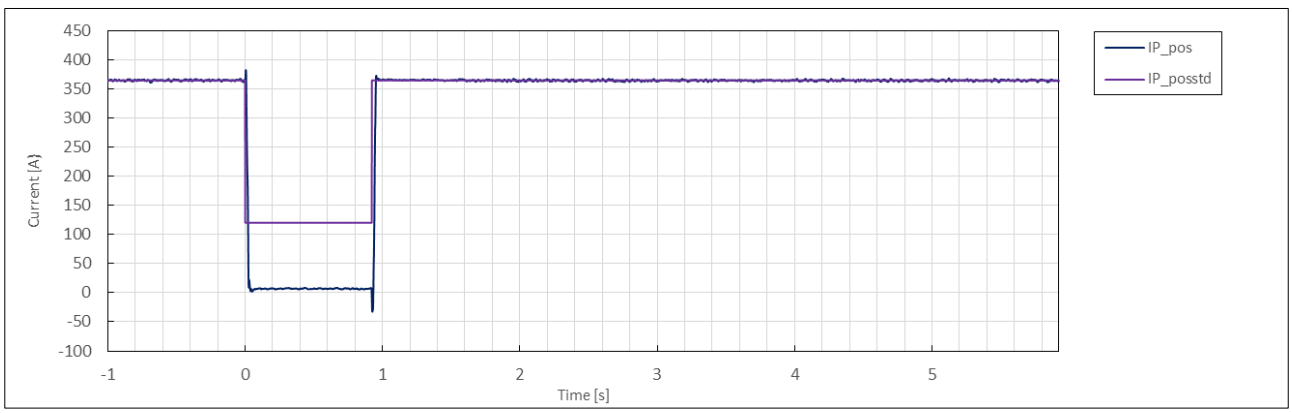


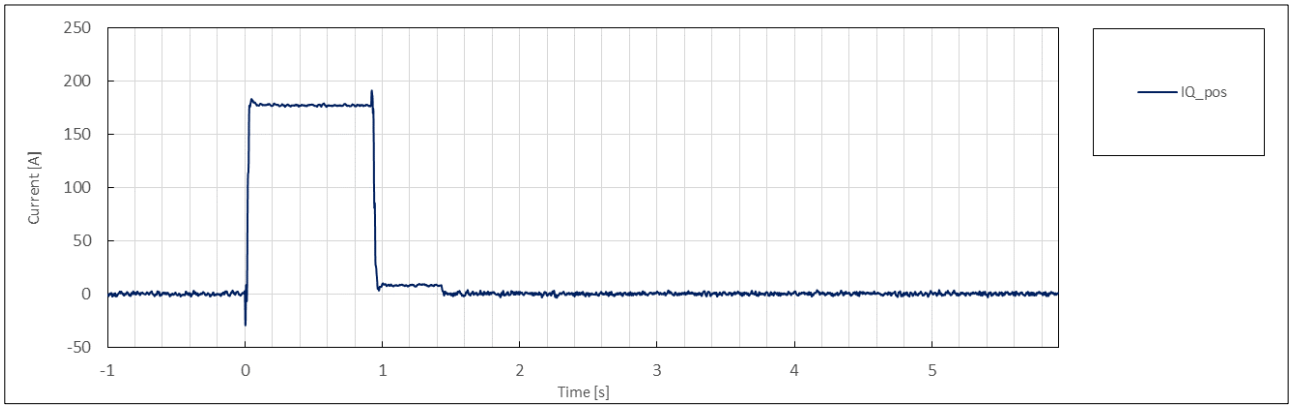


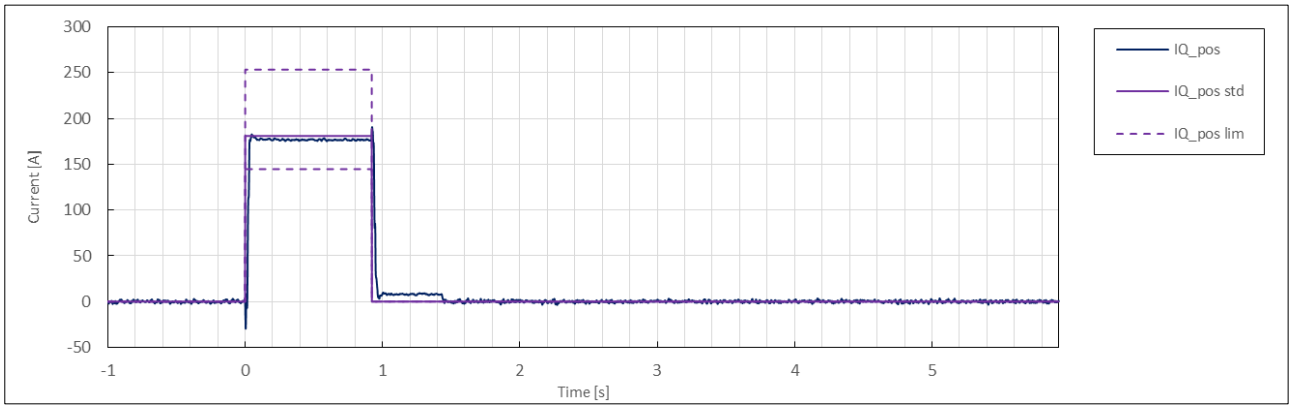

Current [A]
Time [s]
Ia
Ib
Ic

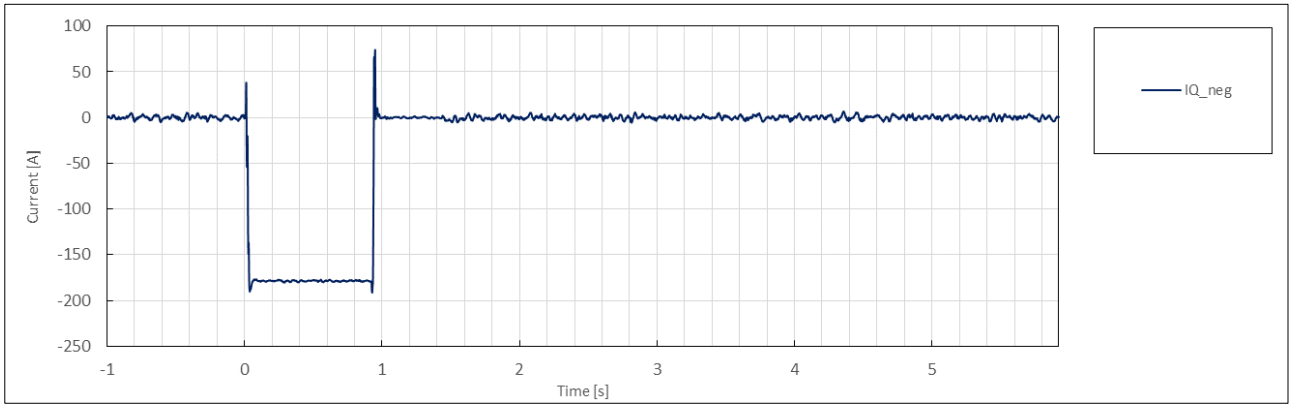

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

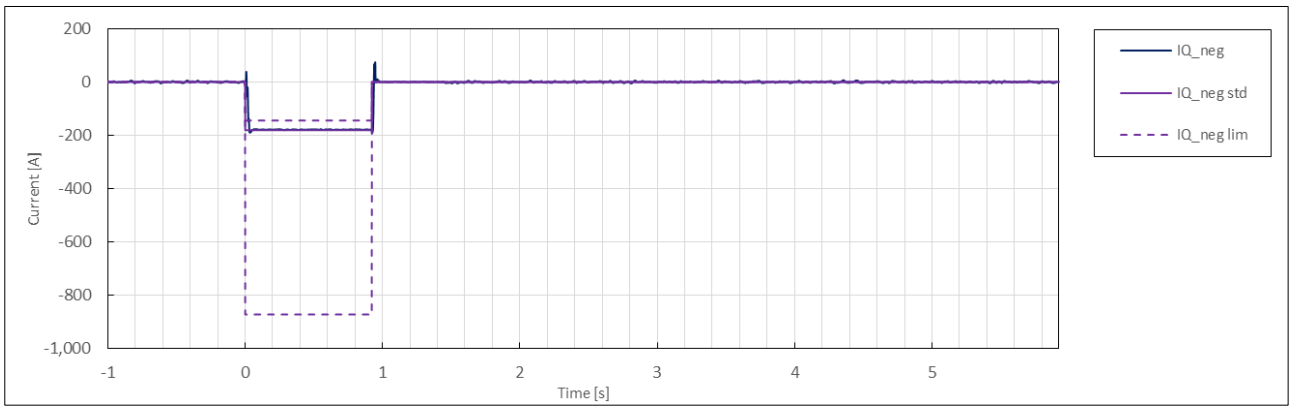

Current [A]
Time [s]
IP_pos

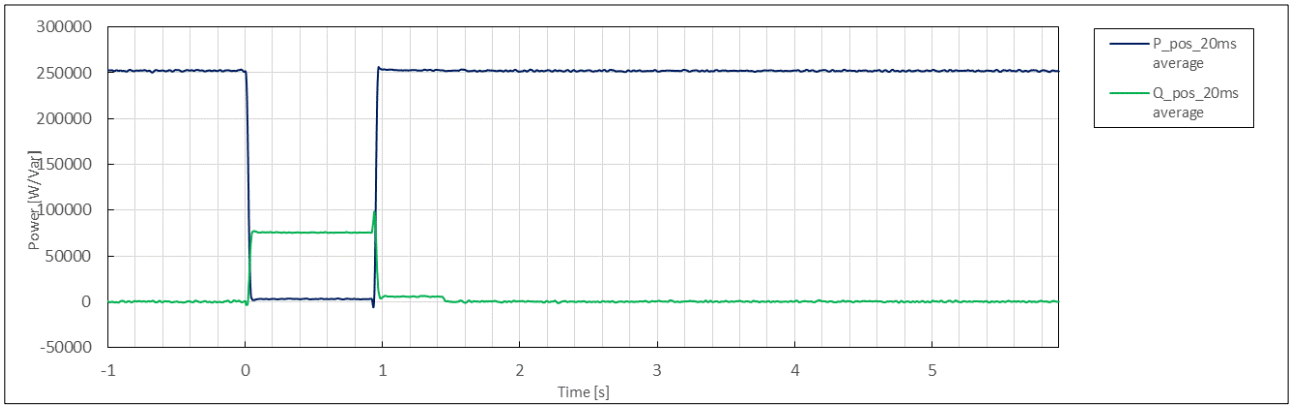

Current [A]
Time [s]
IP_pos
IP_posstd


250
200
150
100
50
0
-50
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos

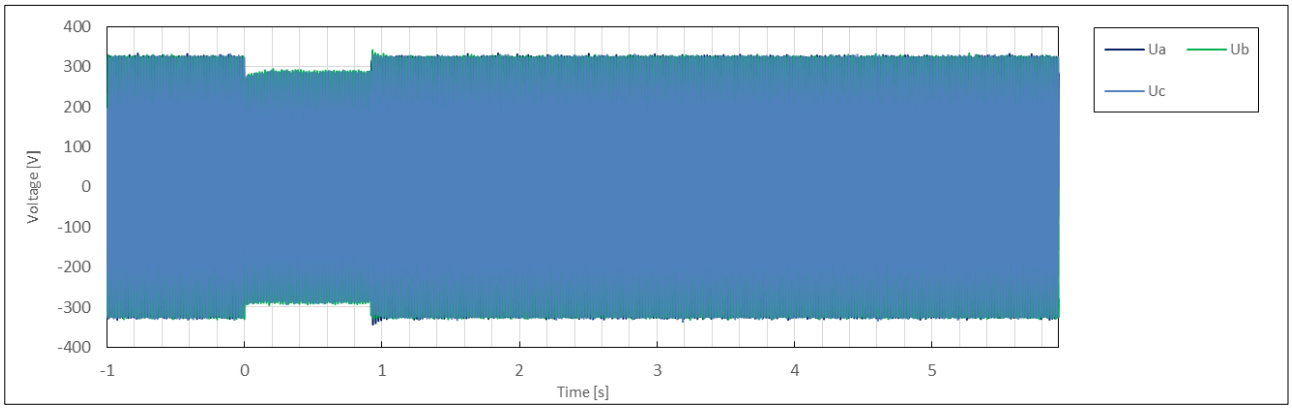

300
250
200
150
100
50
0
-50
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

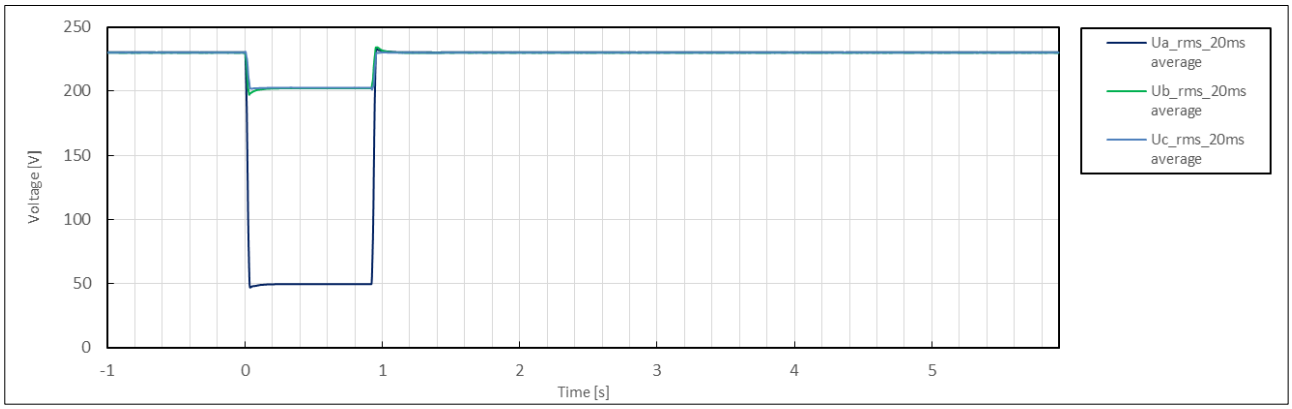

100
50
0
-50
-100
-150
-200
-250
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg

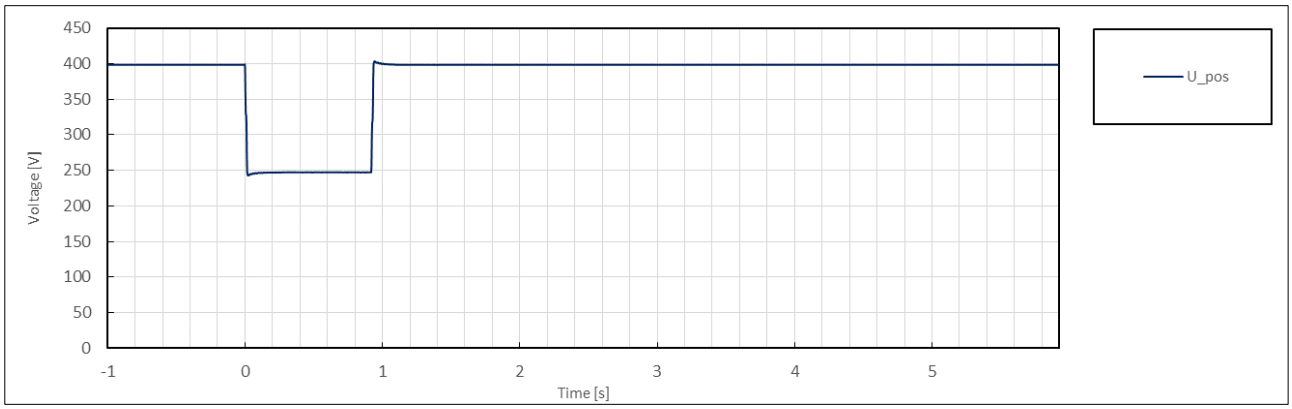

200
0
-200
-400
-600
-800
-1,000
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

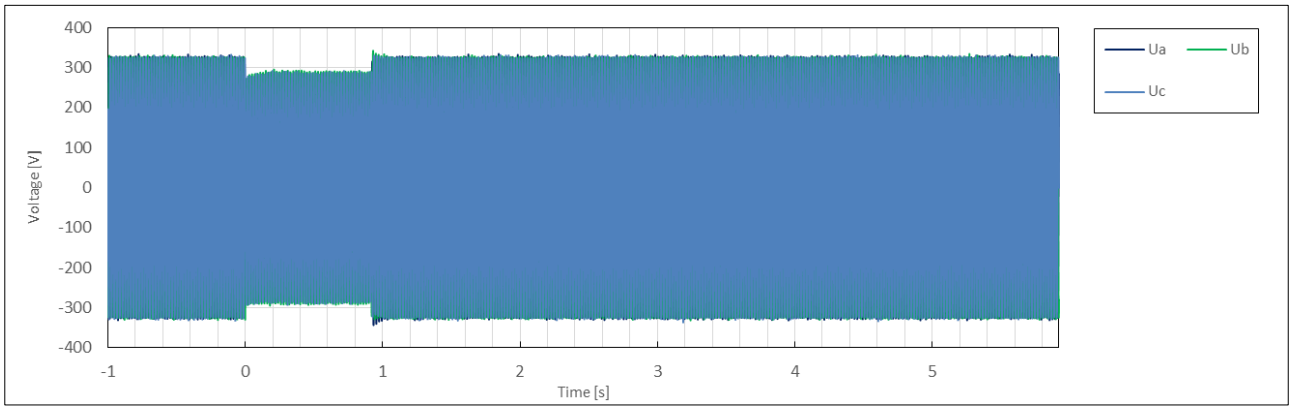
No. 2.4 Idle Test

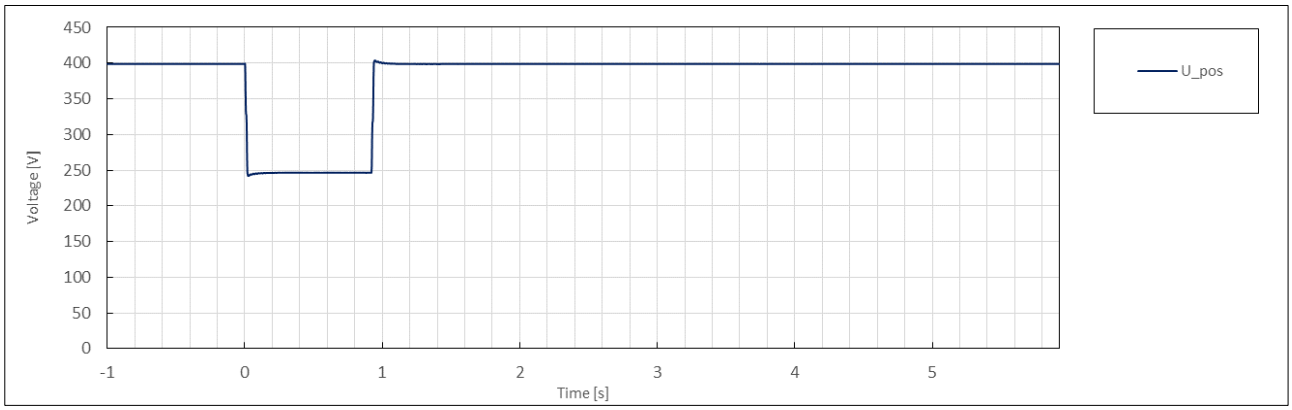


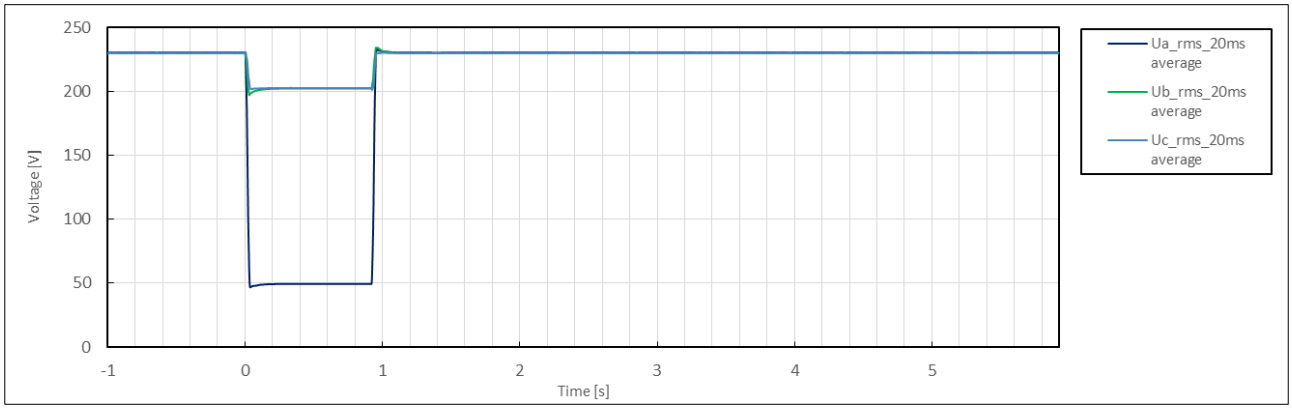


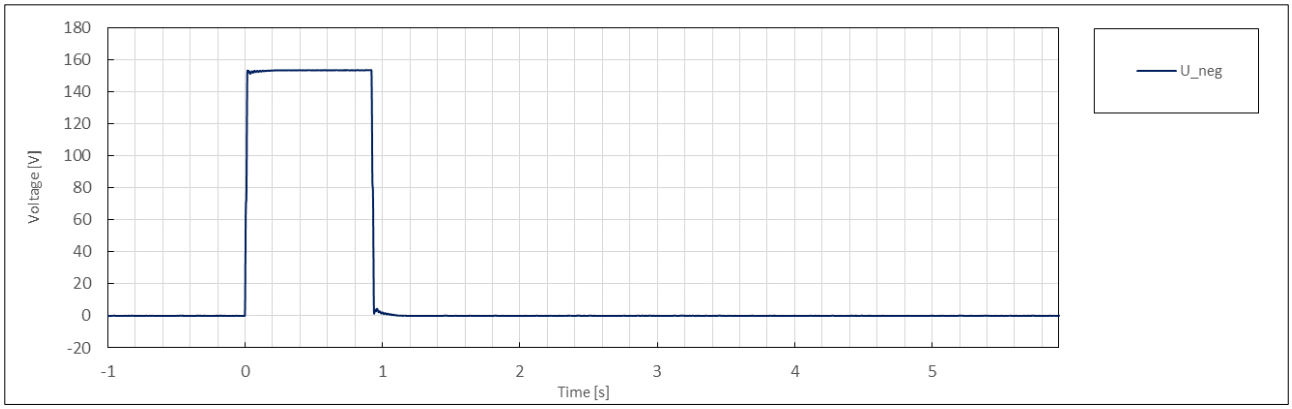


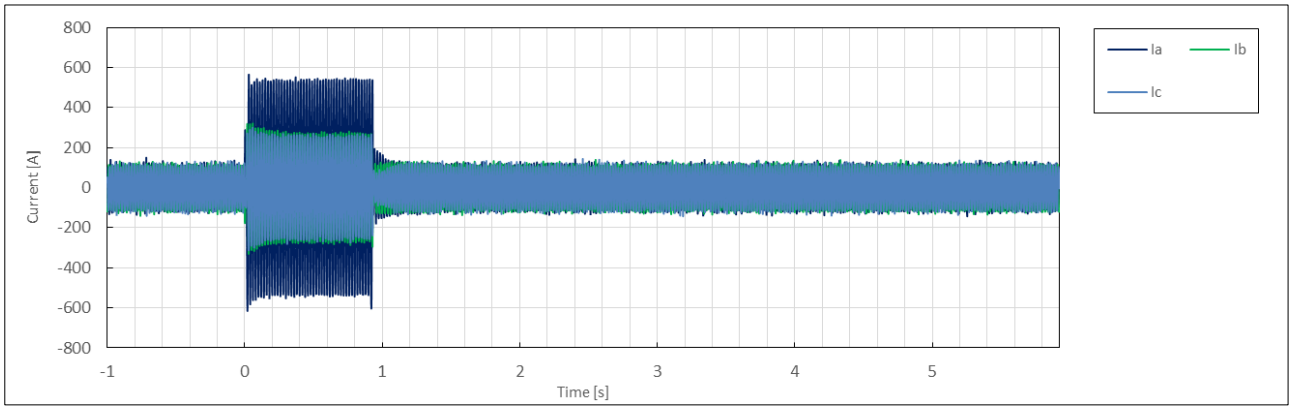
No. 2.4 Load Test

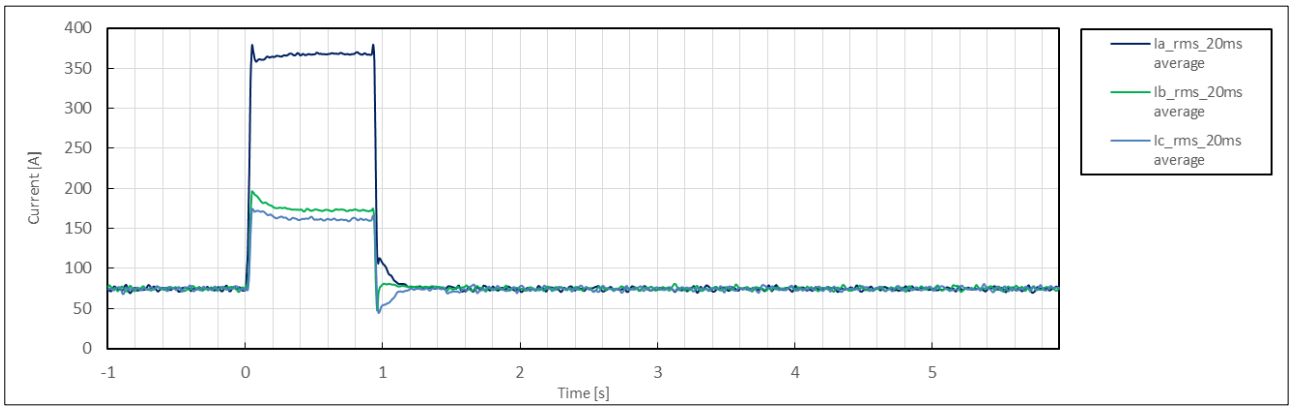


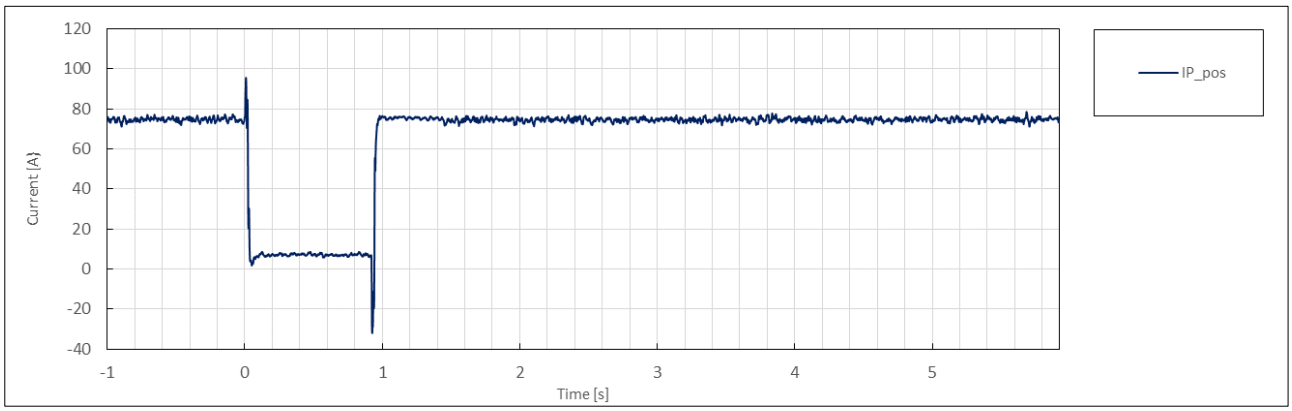


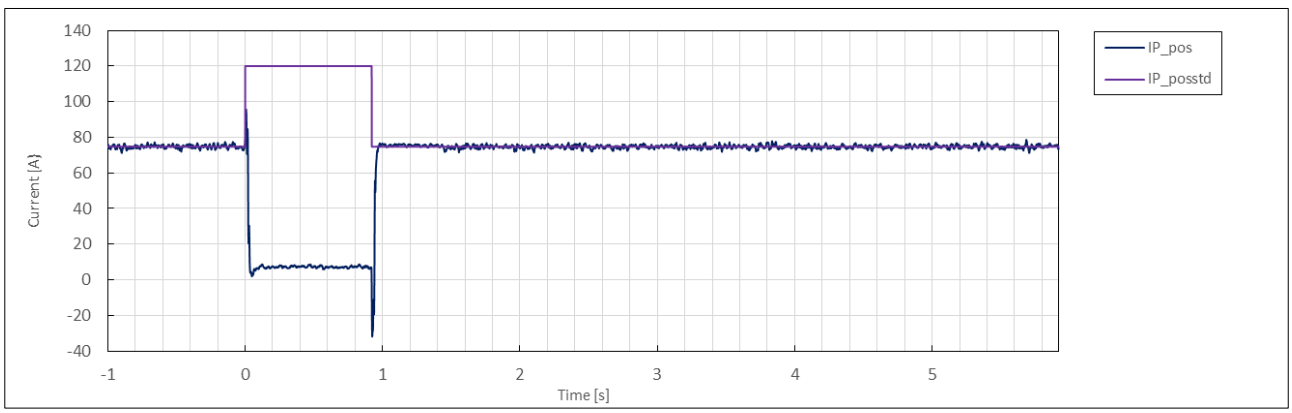


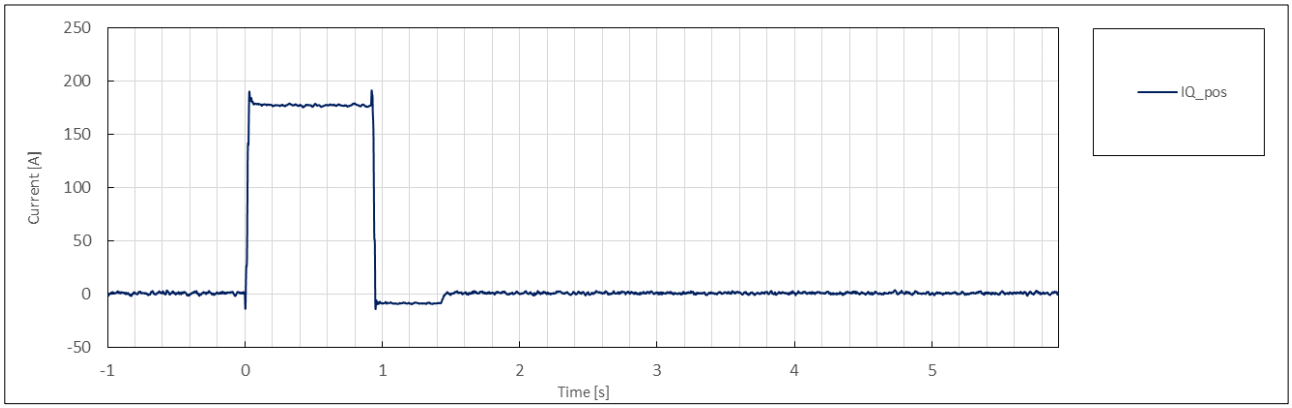


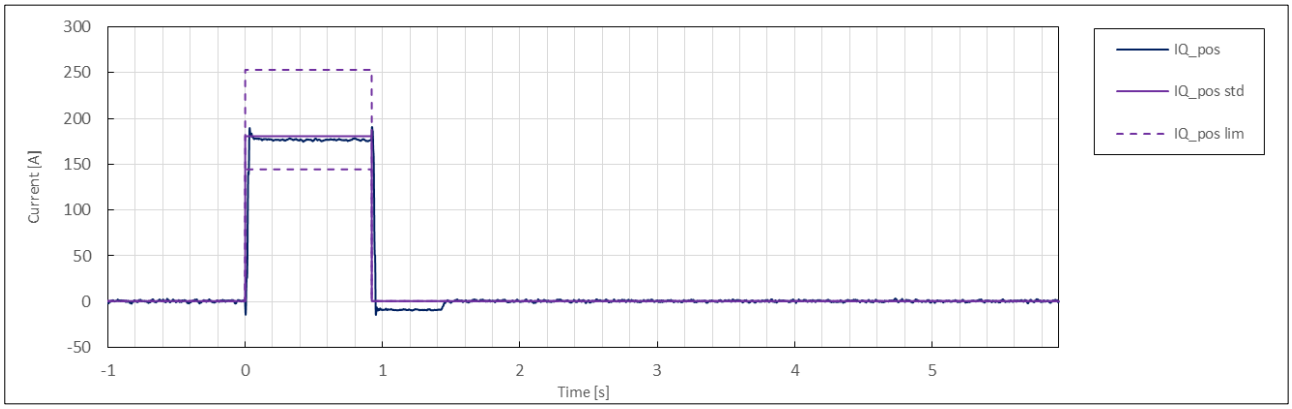

Current [A]
Time [s]
Ia
Ib
Ic

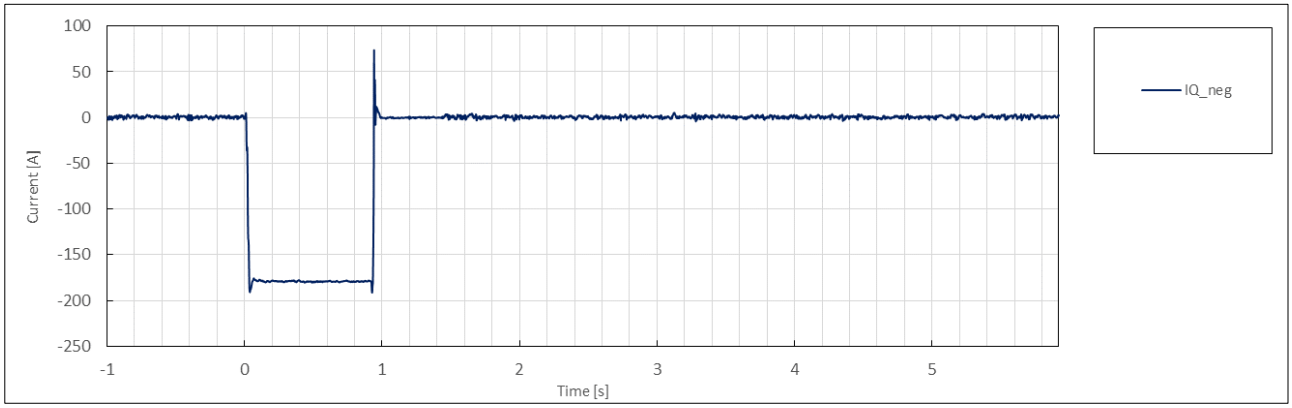

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

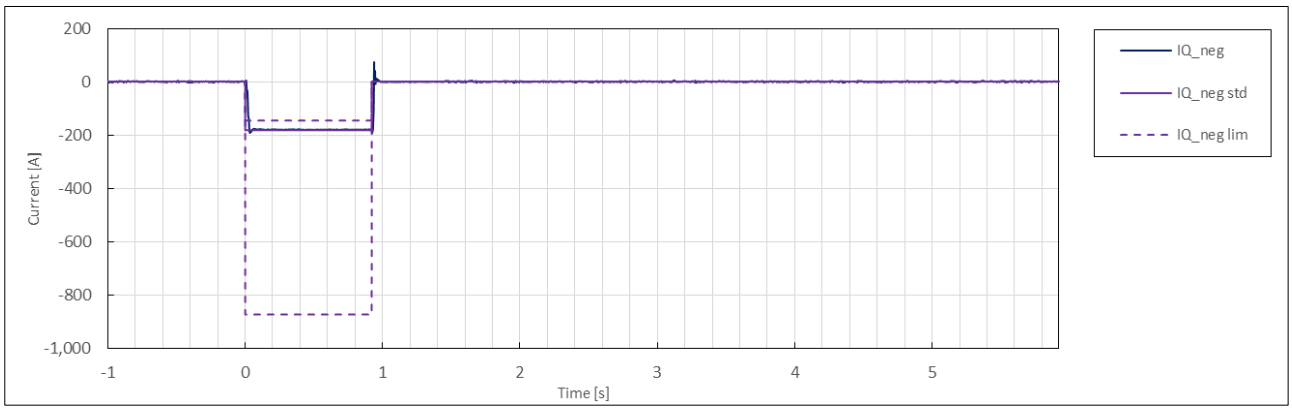

Current [A]
Time [s]
IP_pos

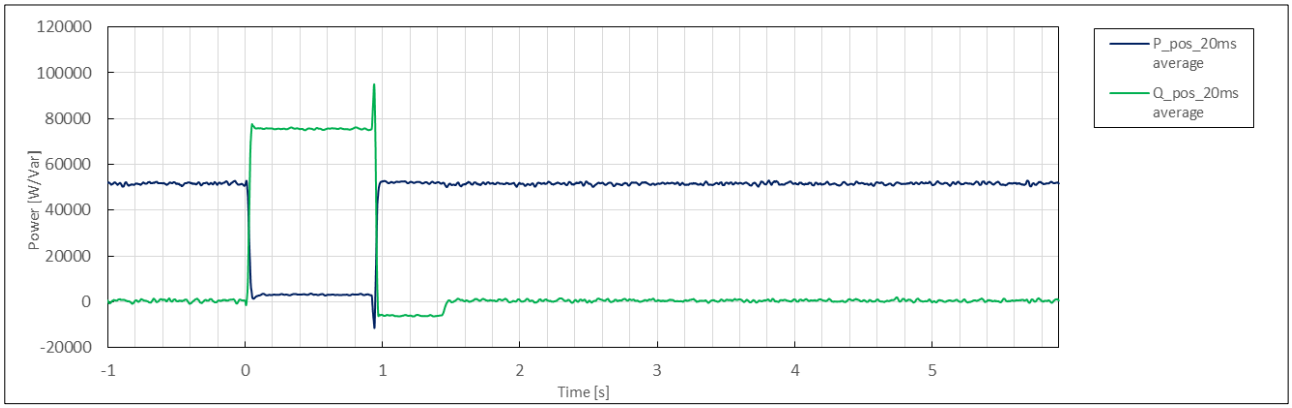

Current [A]
Time [s]
IP_pos
IP_posstd


250
200
150
100
50
0
-50
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos

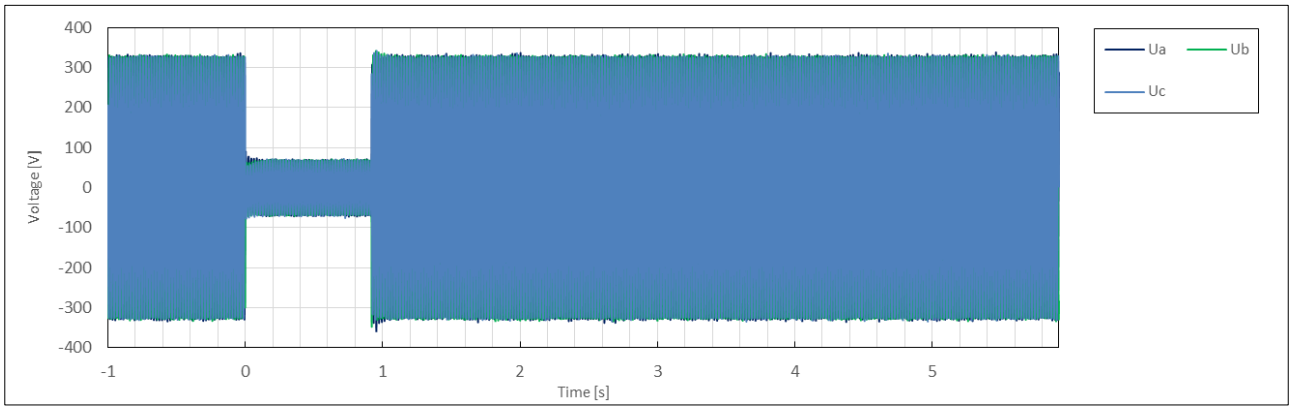

300
250
200
150
100
50
0
-50
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

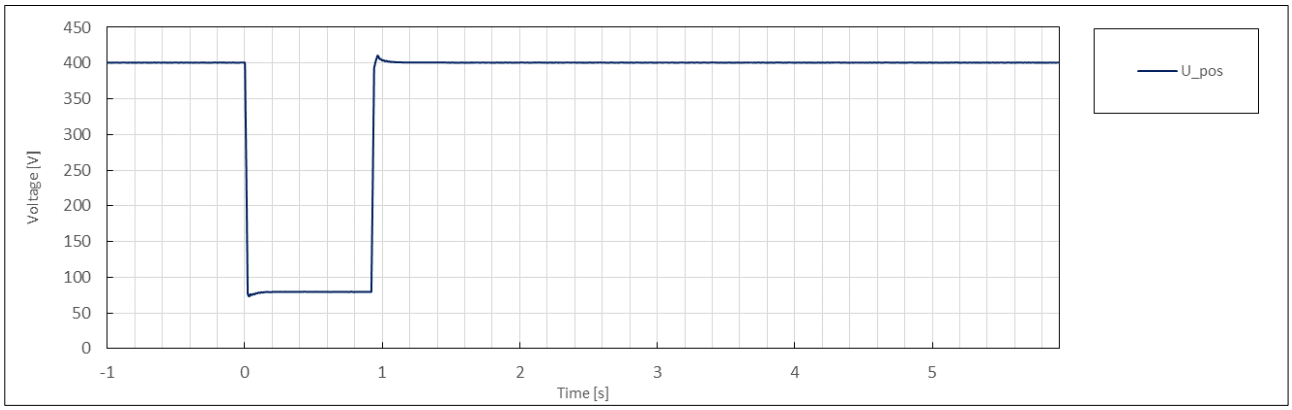

100
50
0
-50
-100
-150
-200
-250
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg

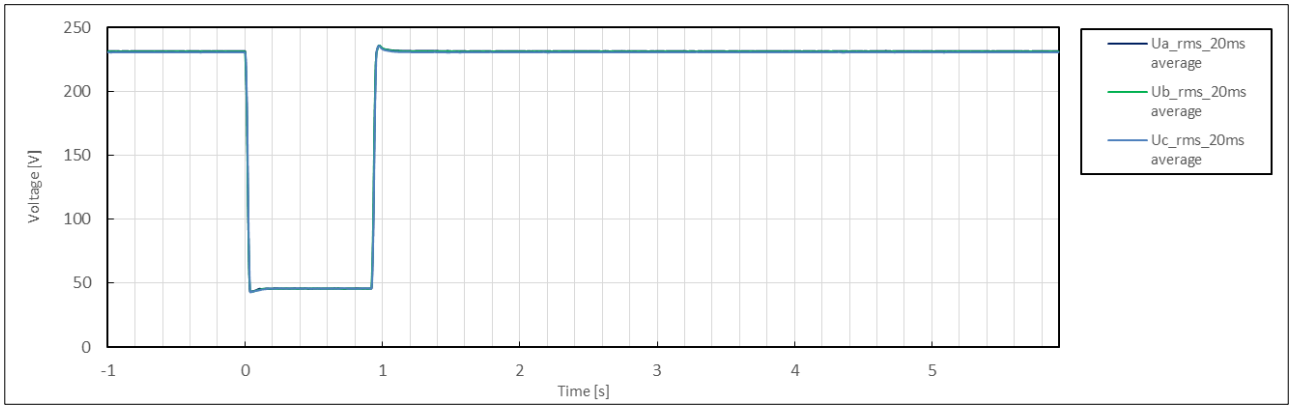

200
0
-200
-400
-600
-800
-1,000
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


120000
100000
80000
60000
40000
20000
0
-20000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

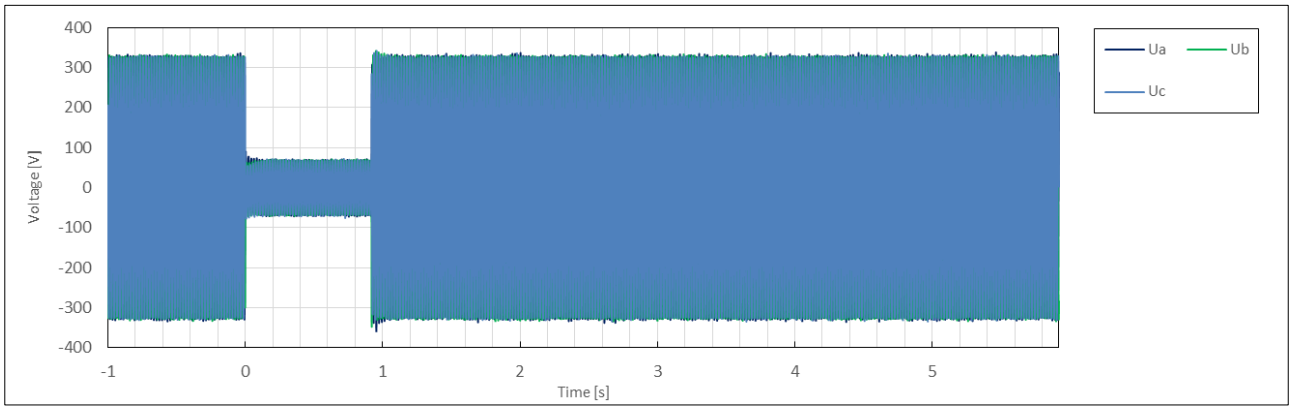
No. 2.5 Idle Test

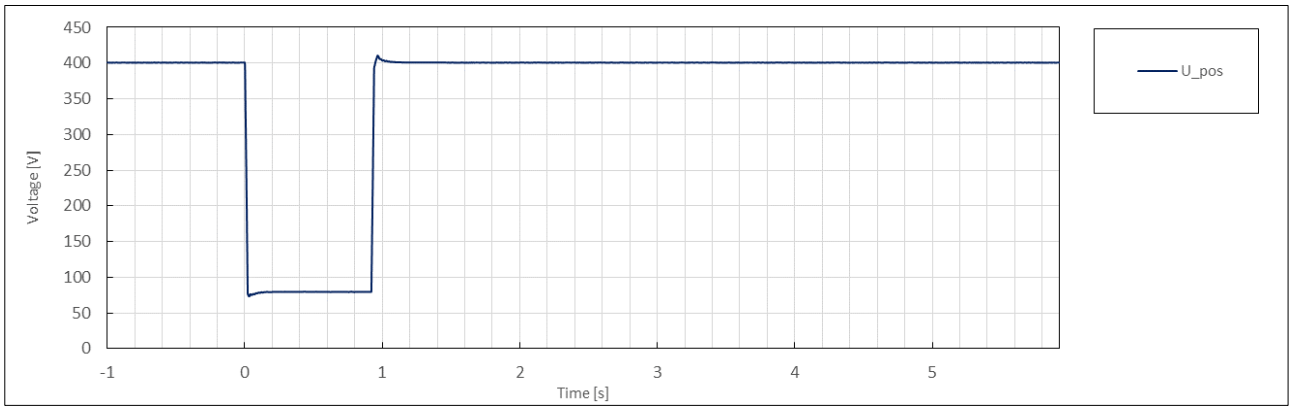


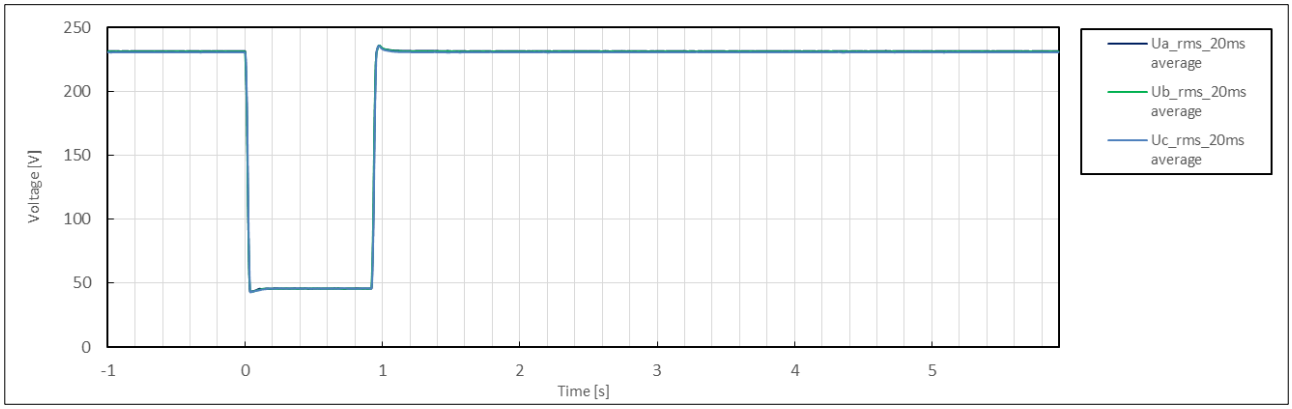


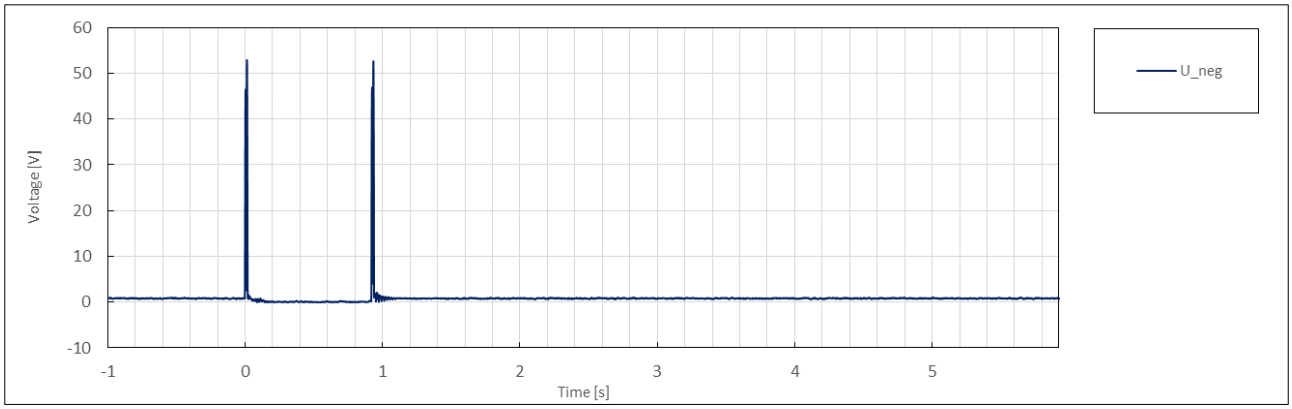


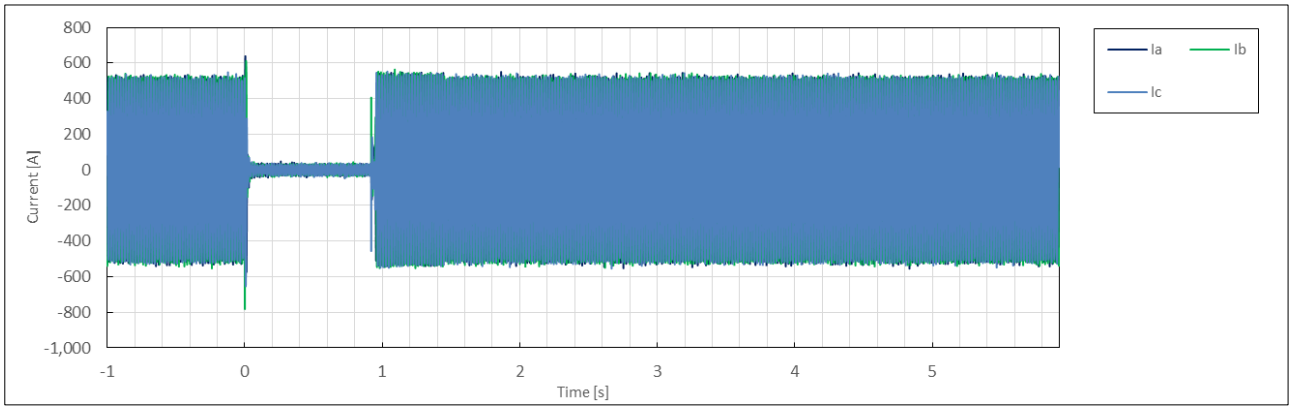
No. 2.5 Load Test

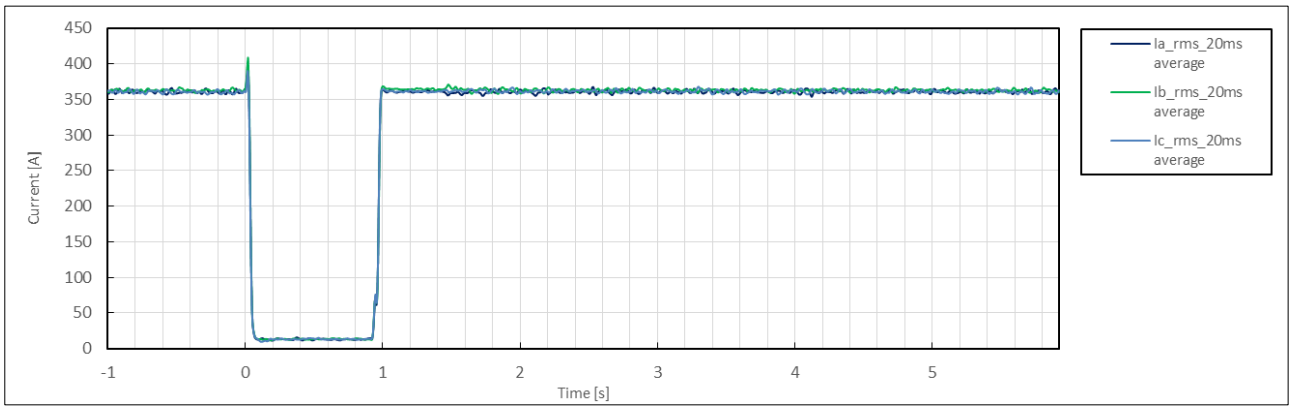


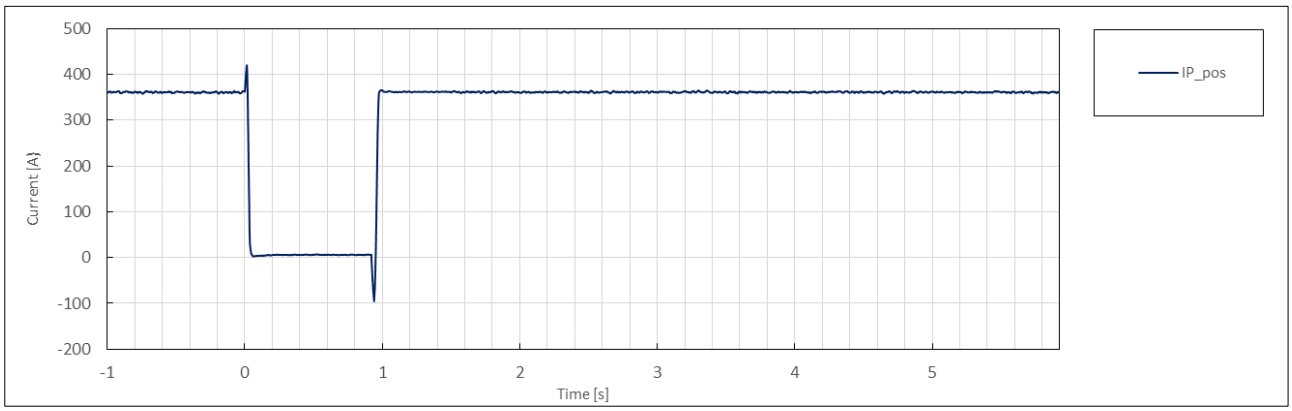


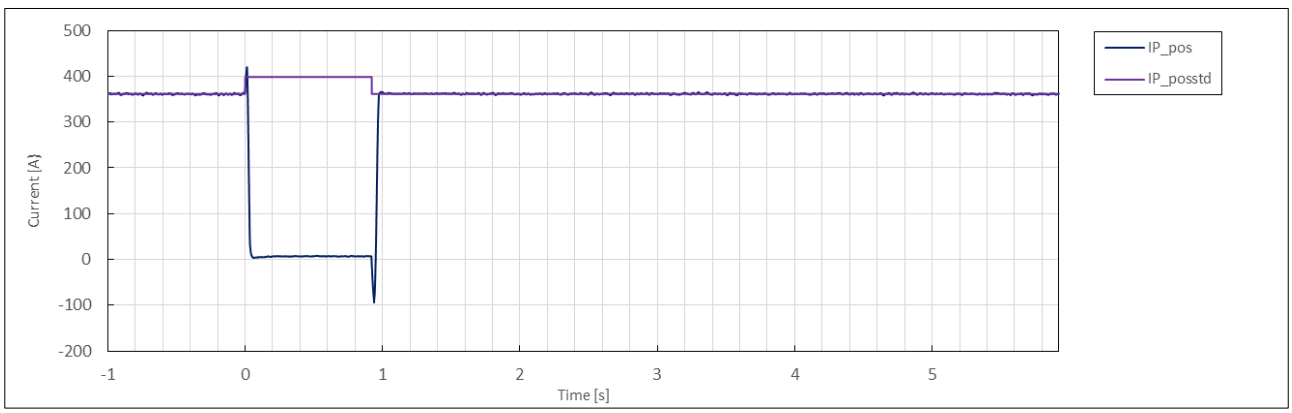


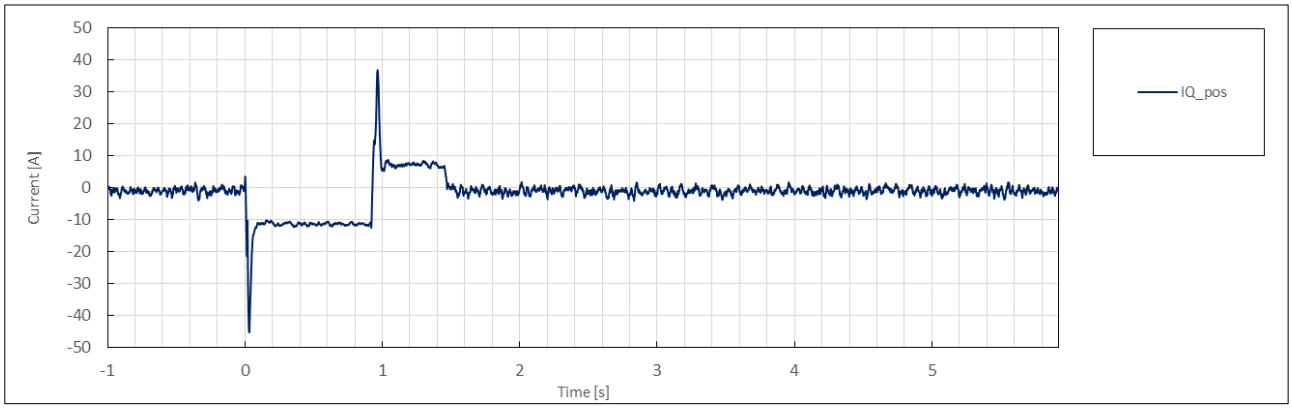


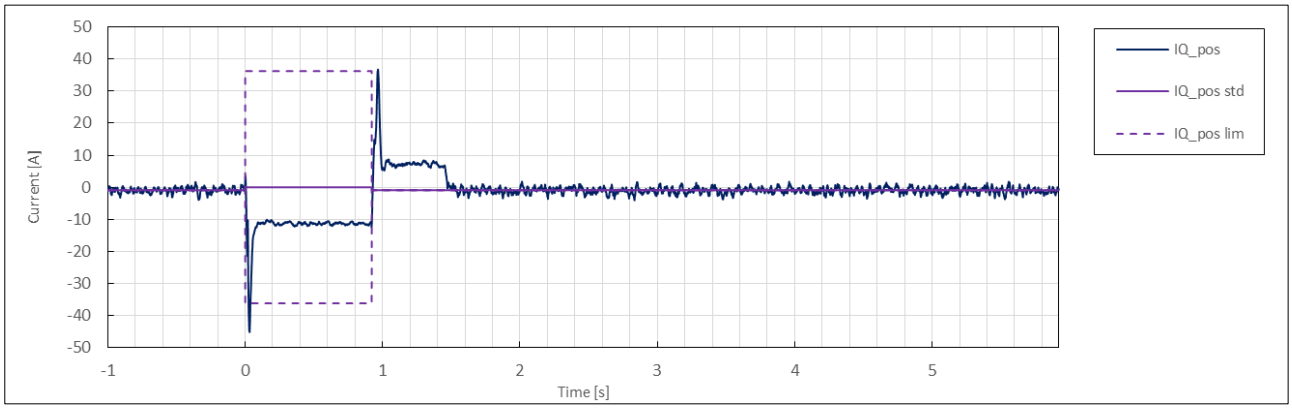

800
600
400
200
0
-200
-400
-600
-800
-1,000
Current [A]
-1
0
1
2
3
4
5
Time [s]
Ia
Ib
Ic

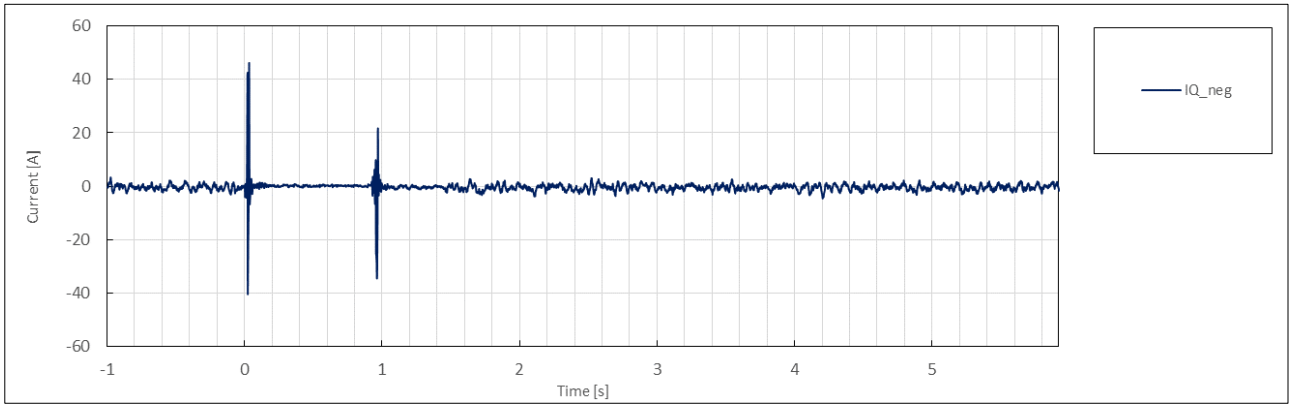

450
400
350
300
250
200
150
100
50
0
Current [A]
-1
0
1
2
3
4
5
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

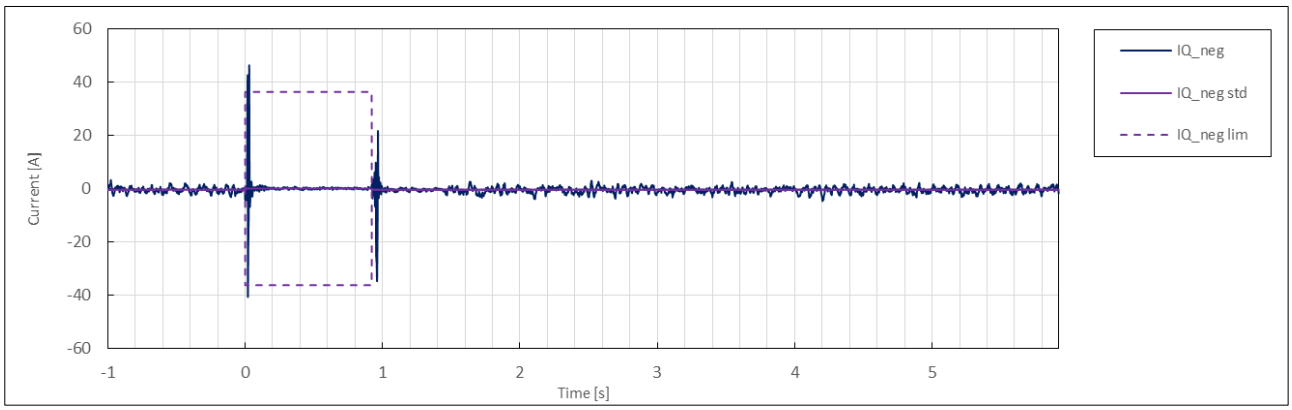

500
400
300
200
100
0
-100
-200
Current [A]
-1
0
1
2
3
4
5
Time [s]
IP_pos

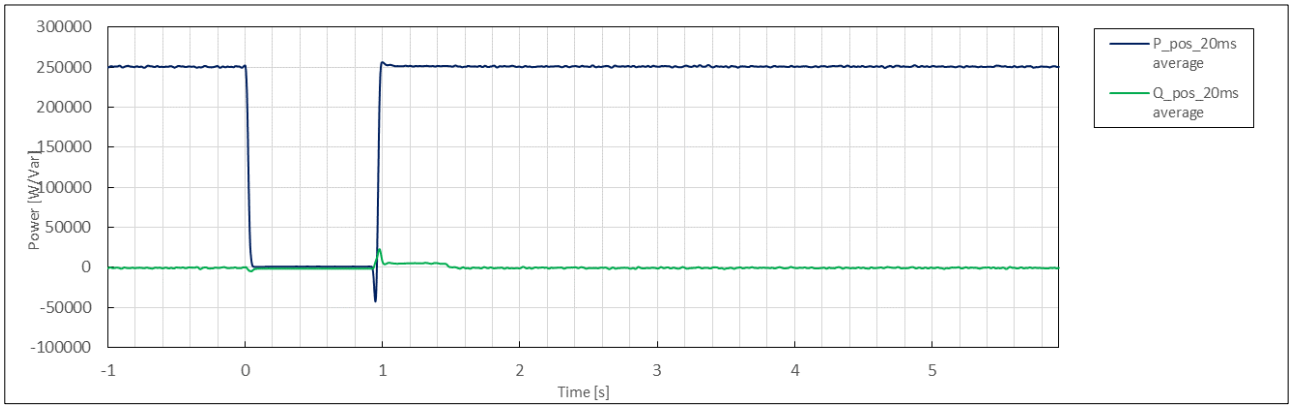

500
400
300
200
100
0
-100
-200
Current [A]
-1
0
1
2
3
4
5
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

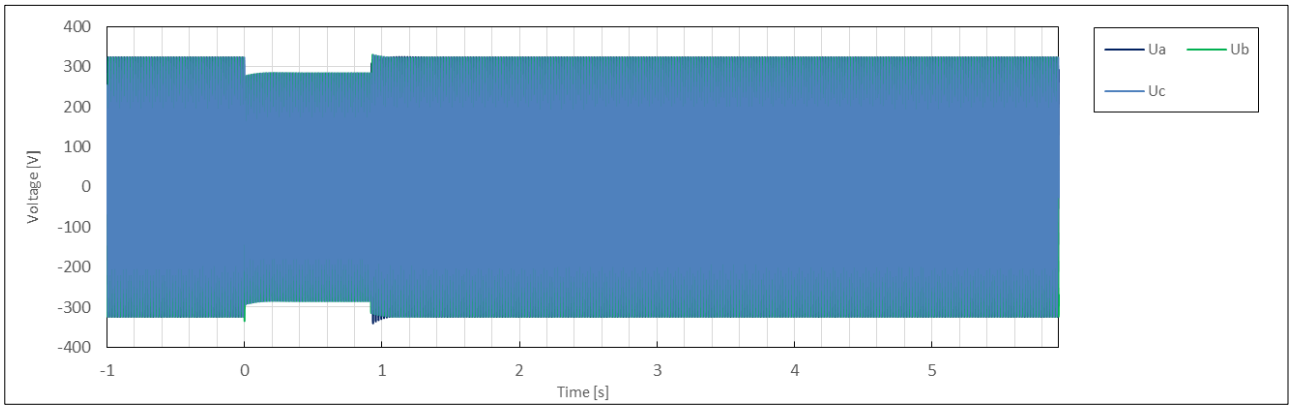

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

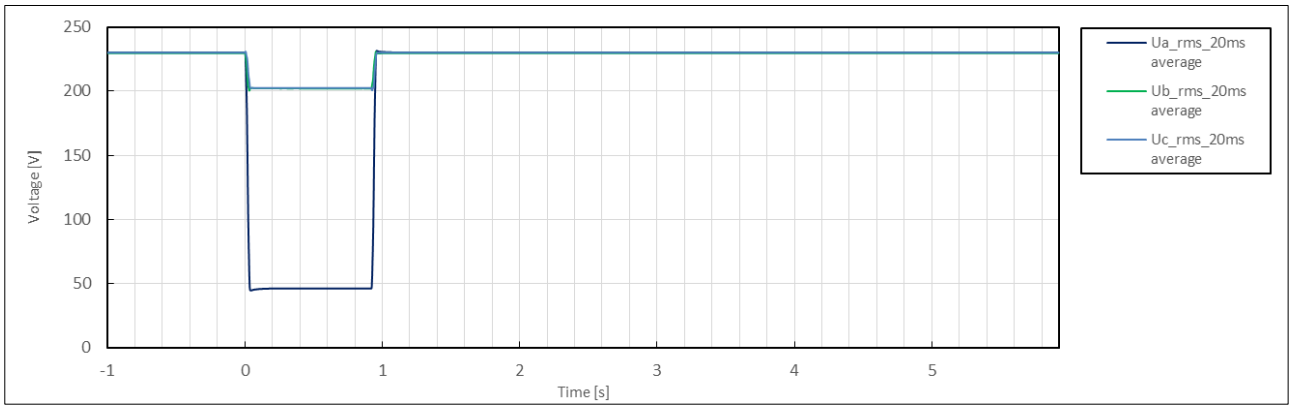

Current [A]
Time [s]
IQ_neg

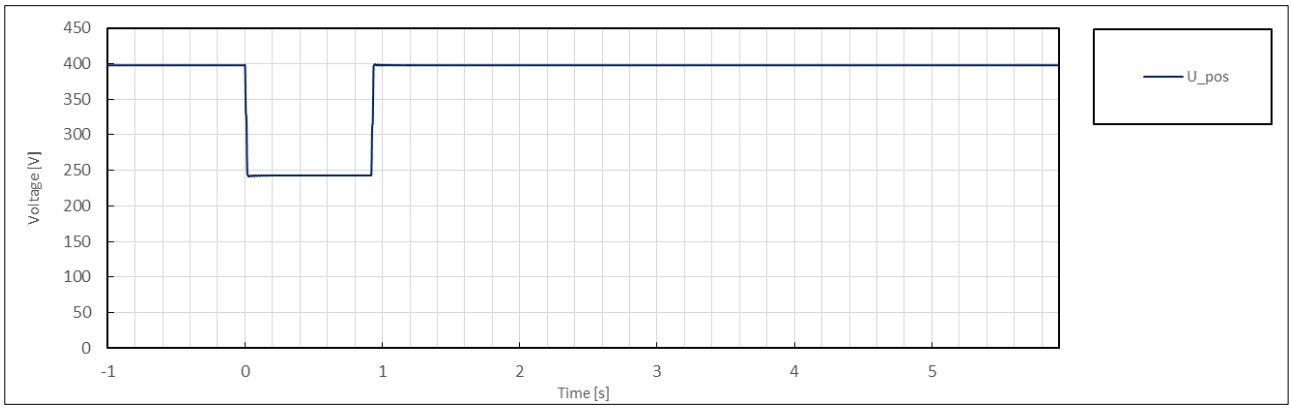

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

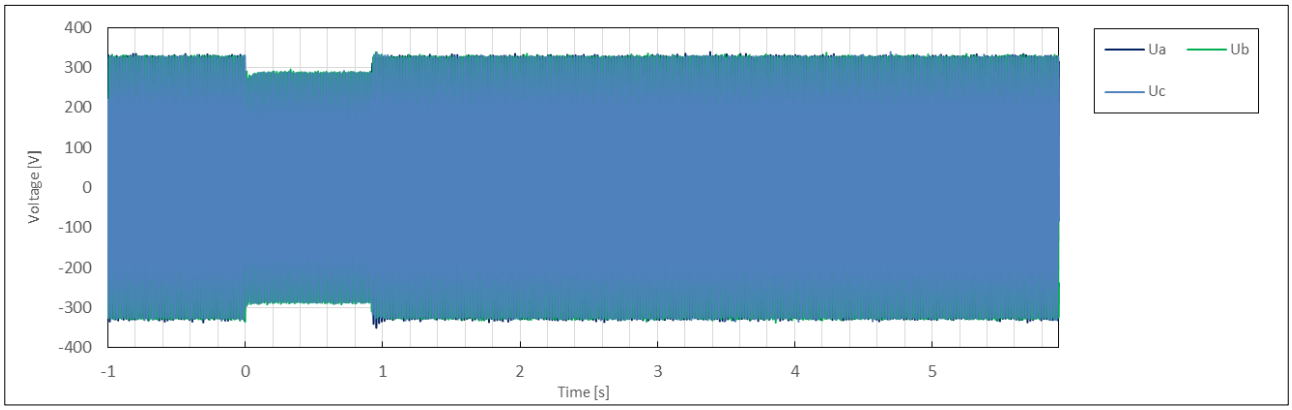
No. 2.6 Idle Test

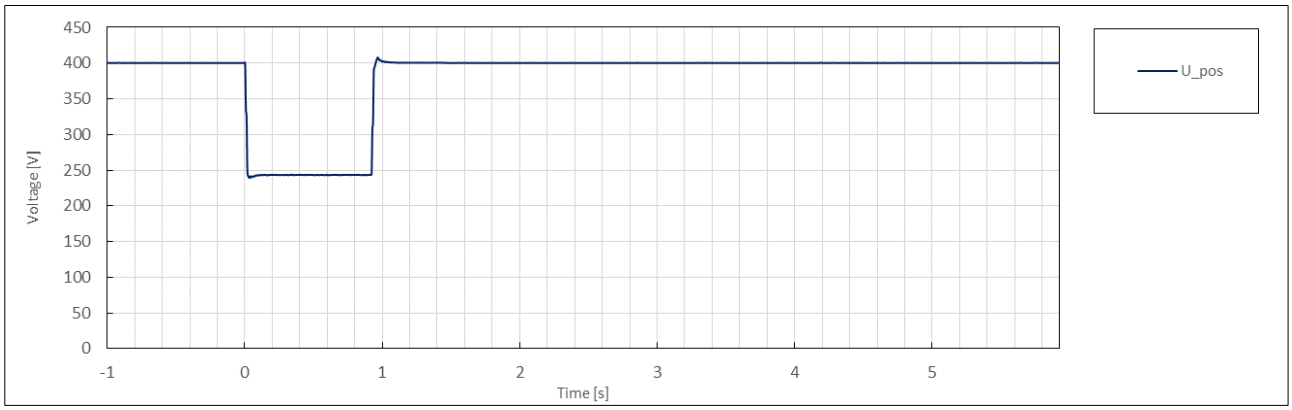


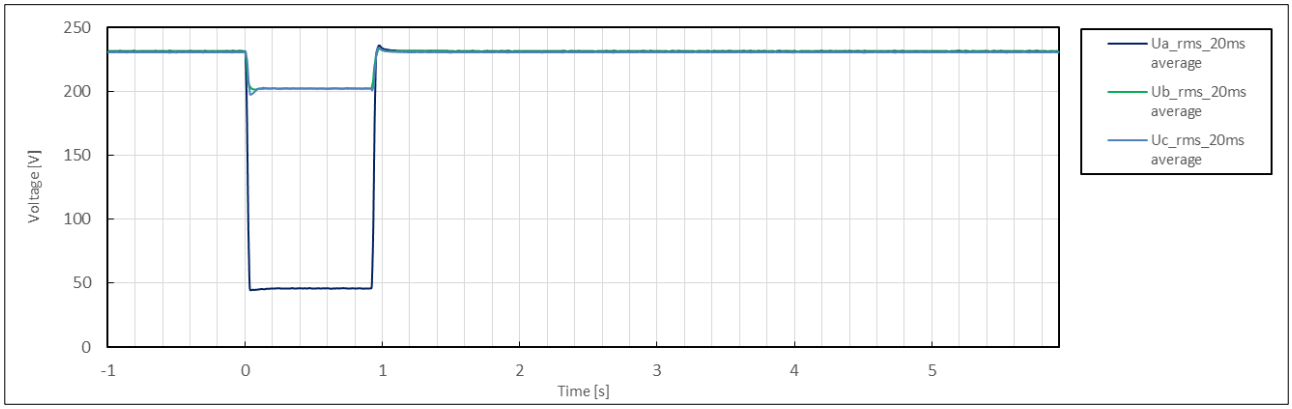


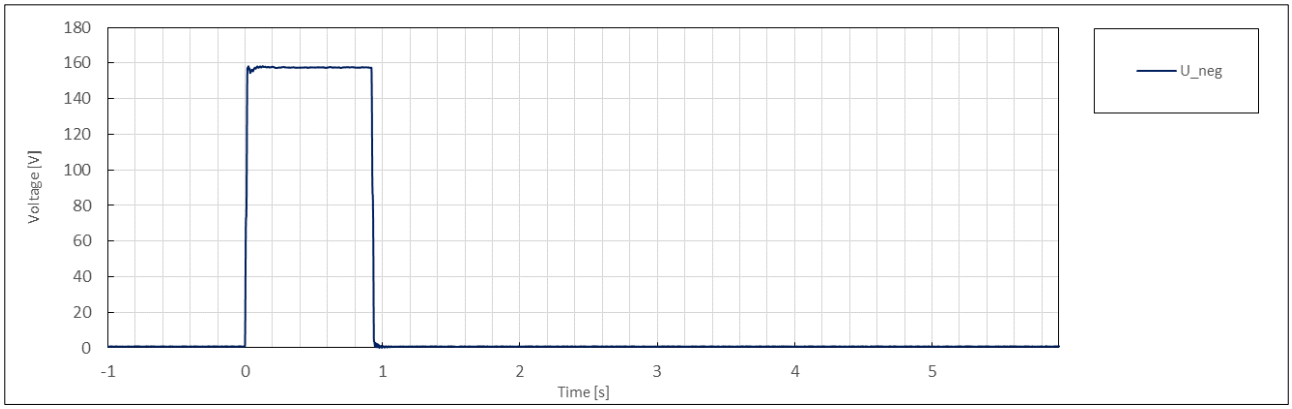


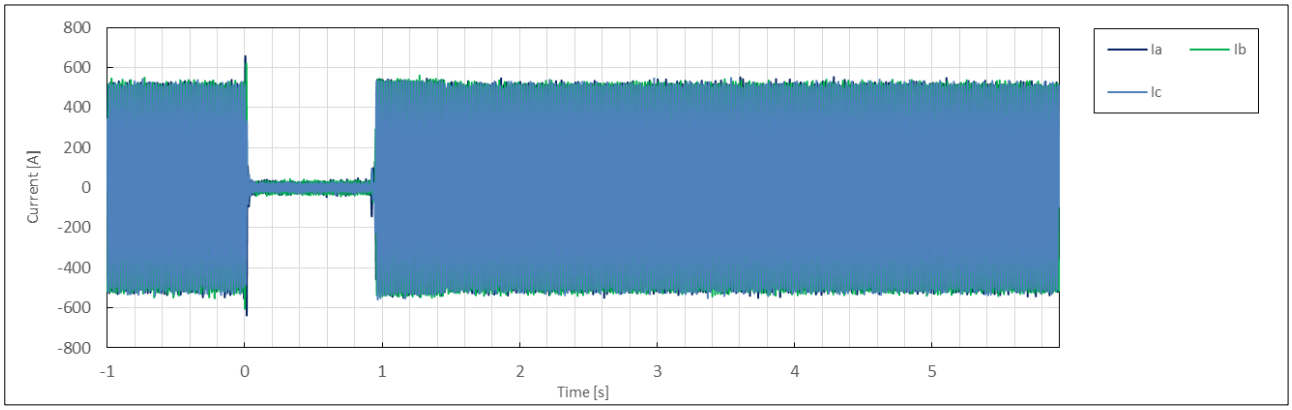
No. 2.6 Load Test

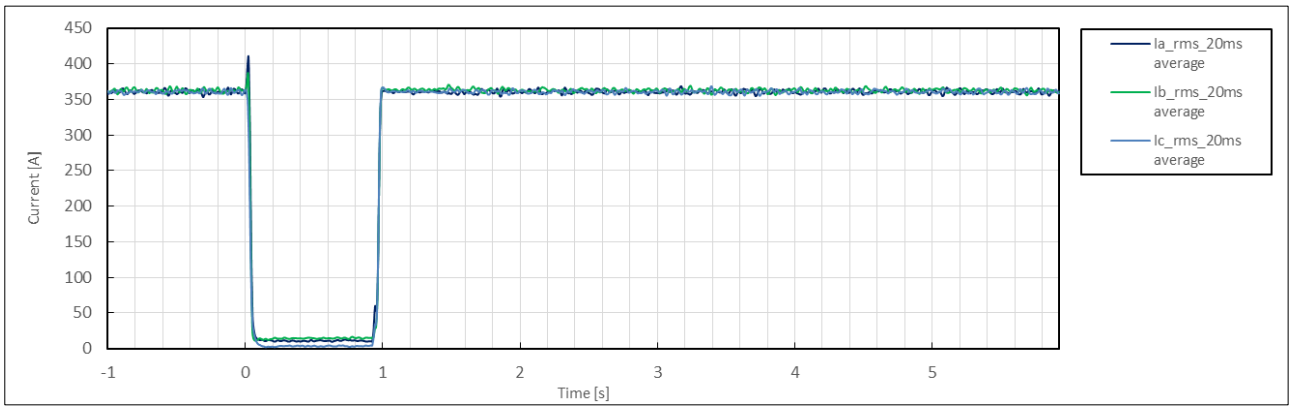


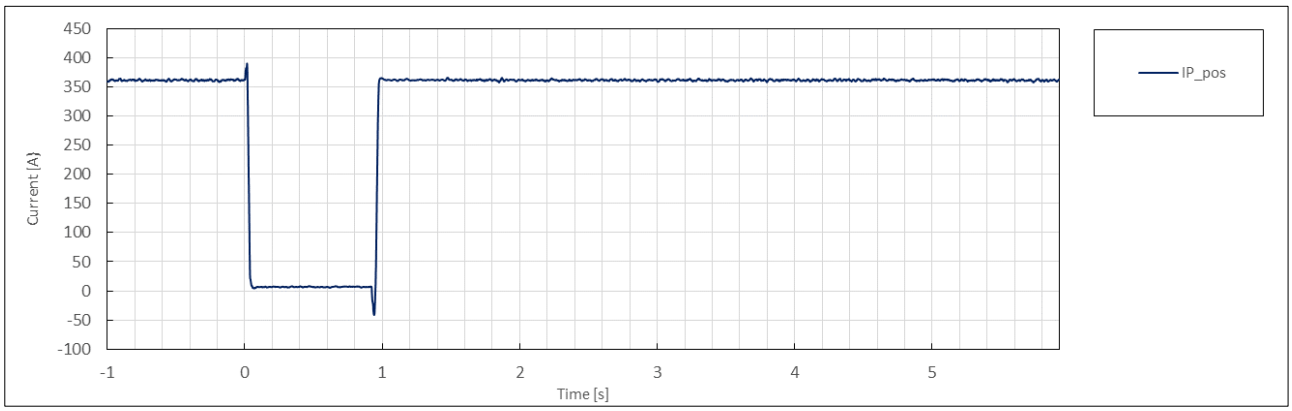


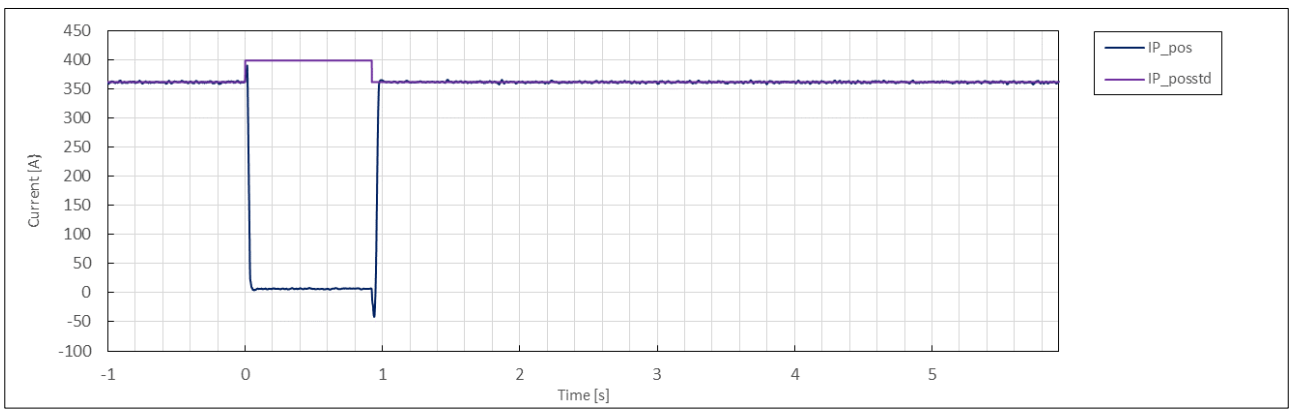


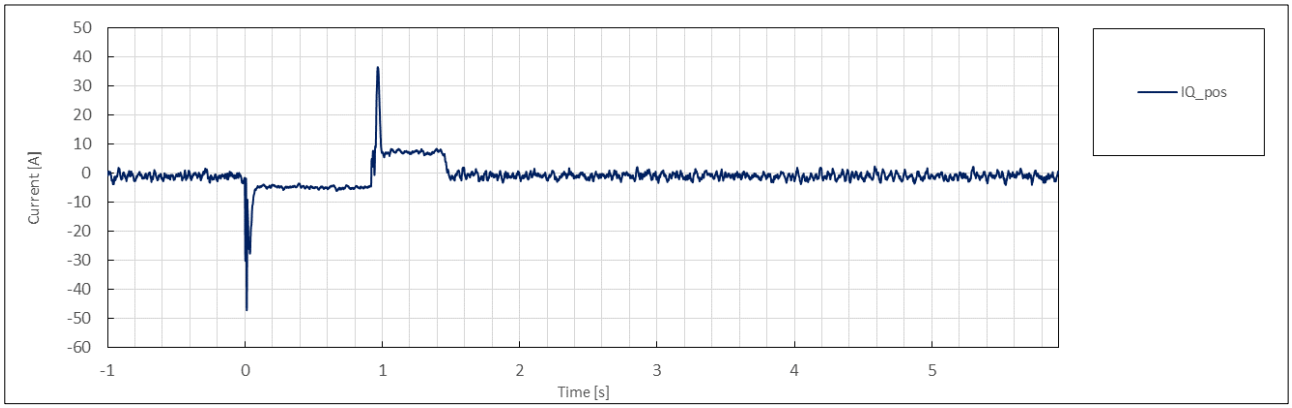


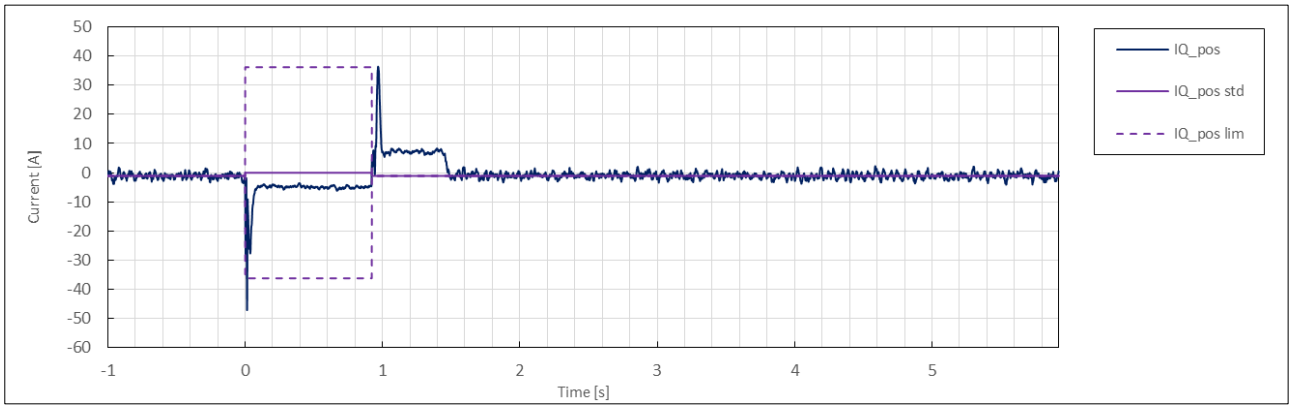

Current [A]
Time [s]
Ia
Ib
Ic

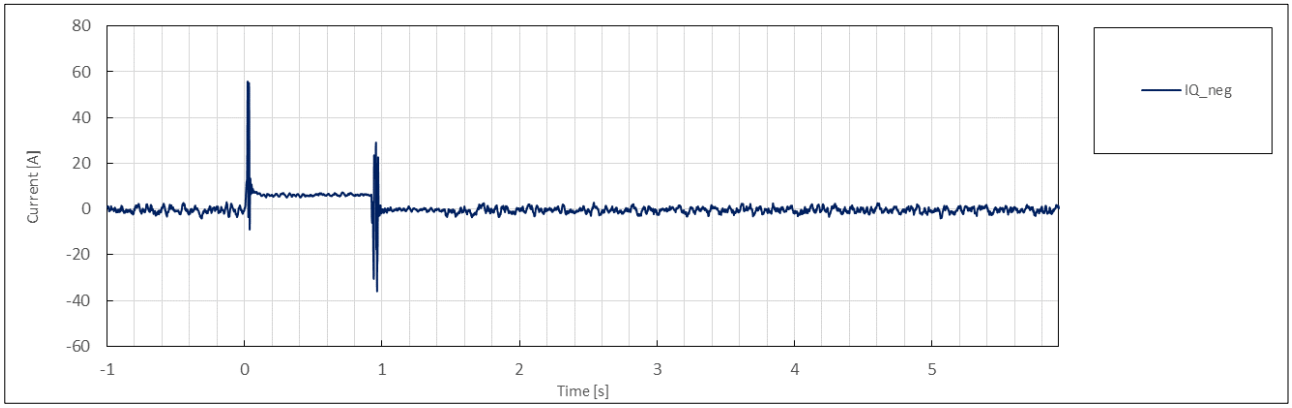

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

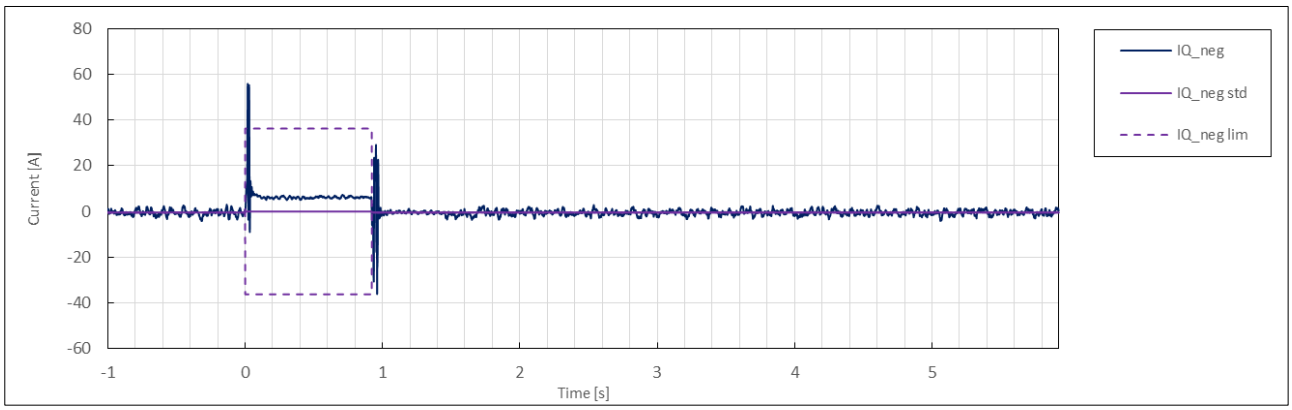

Current [A]
Time [s]
IP_pos

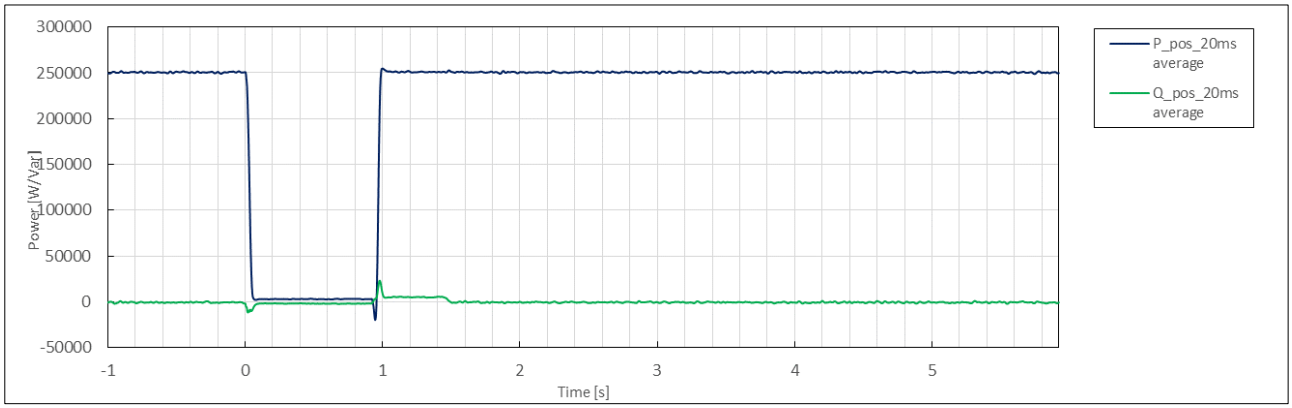

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

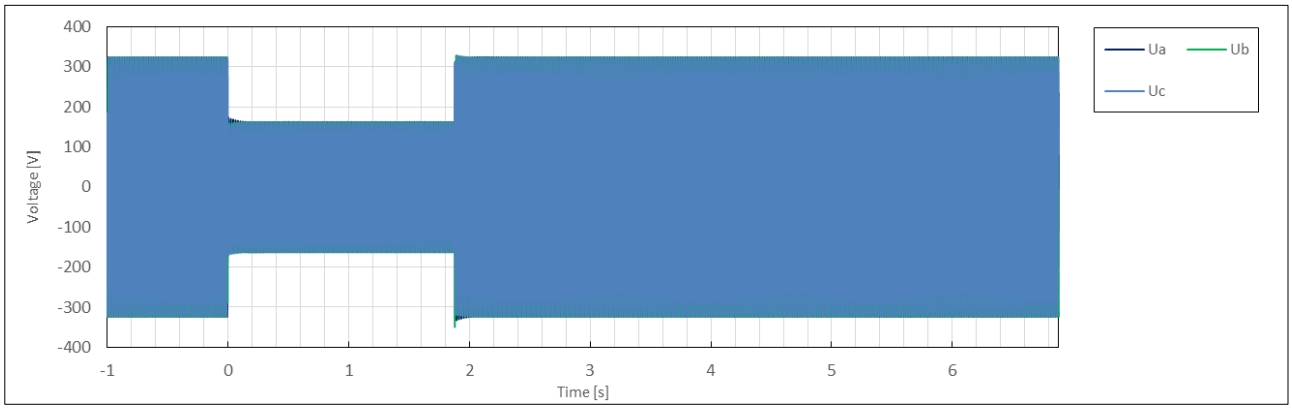

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

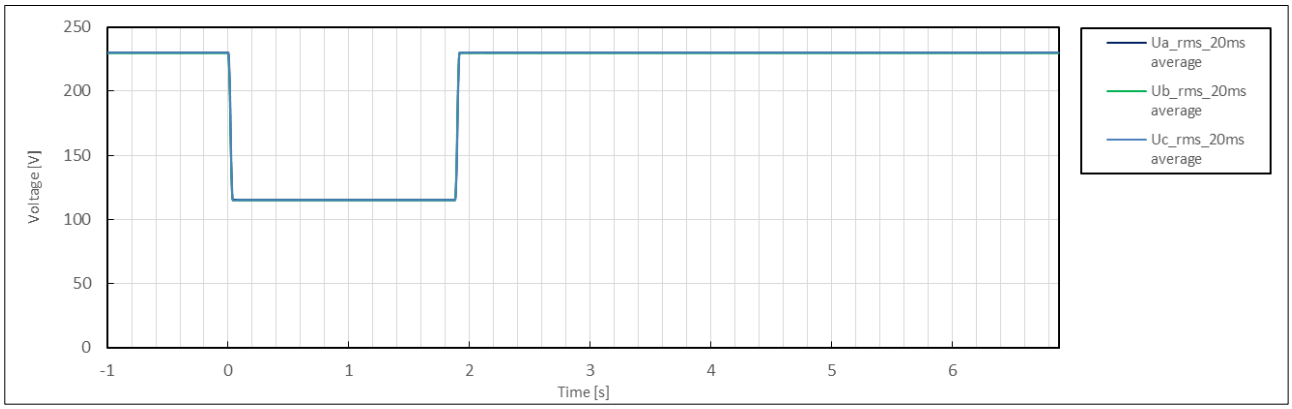

Current [A]
Time [s]
IQ_neg

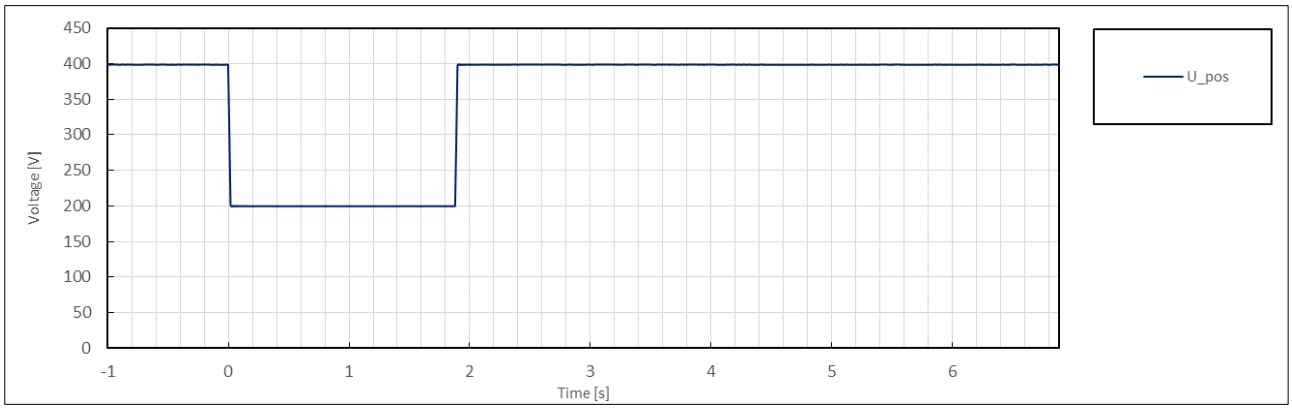

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

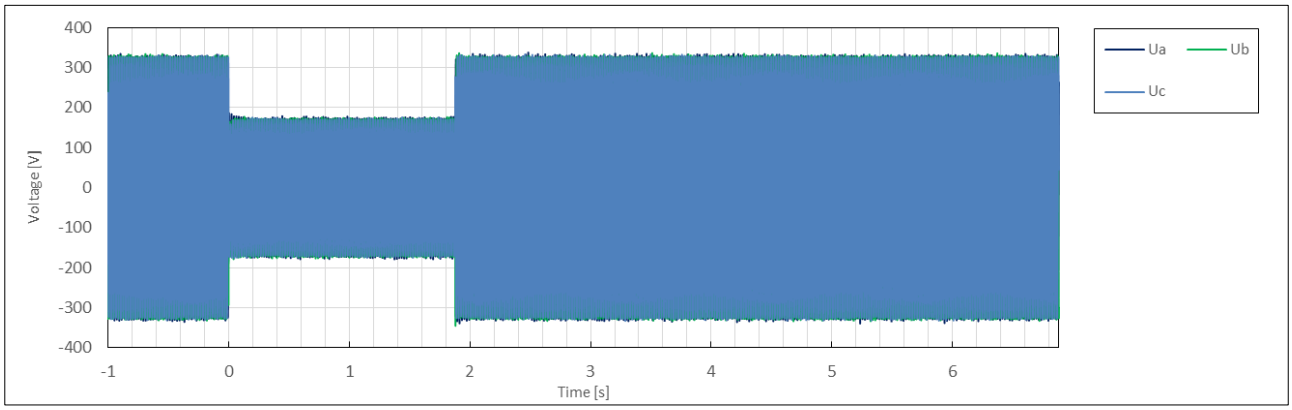
No. 3.1 Idle Test

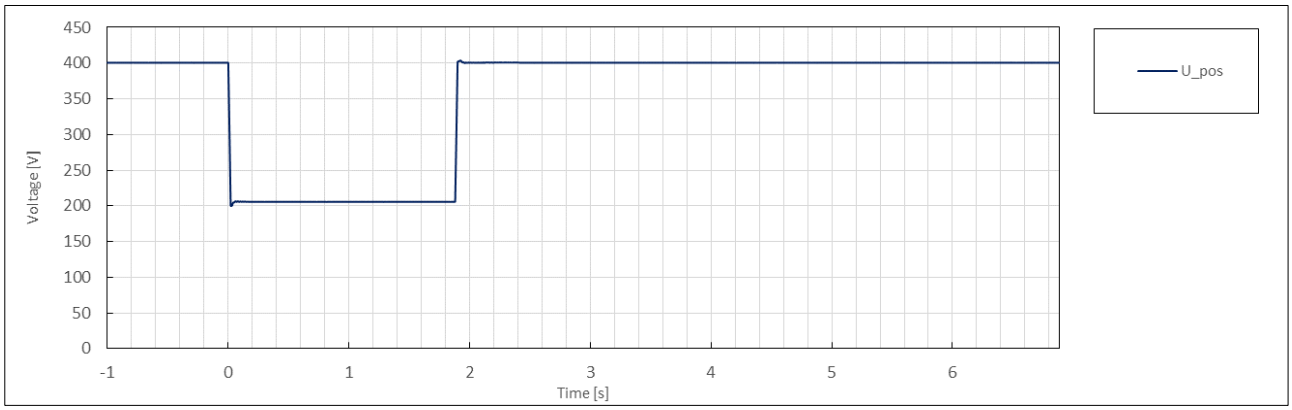


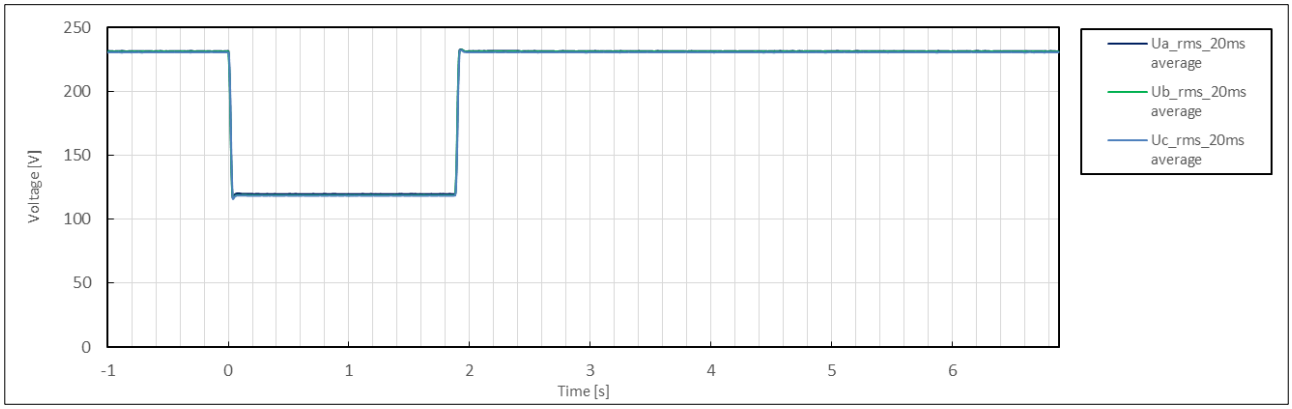


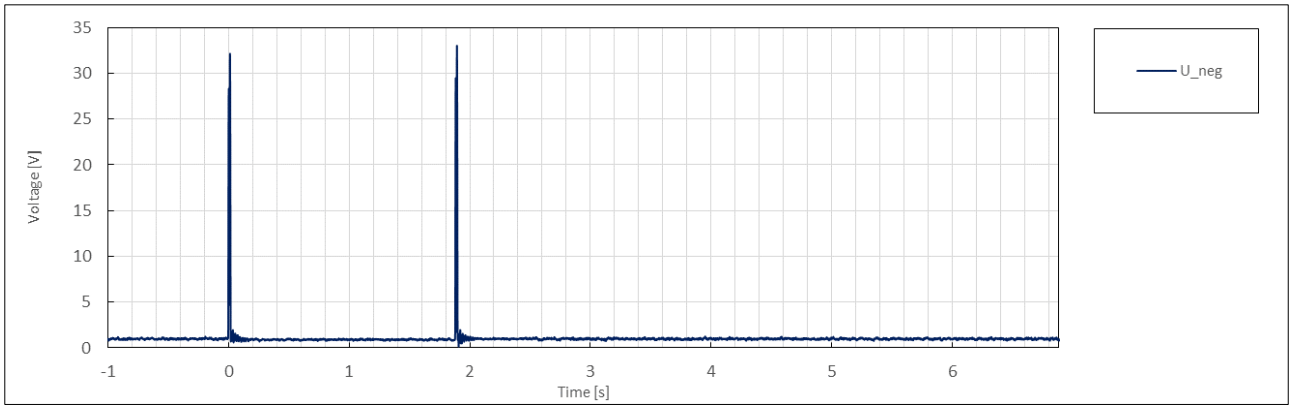


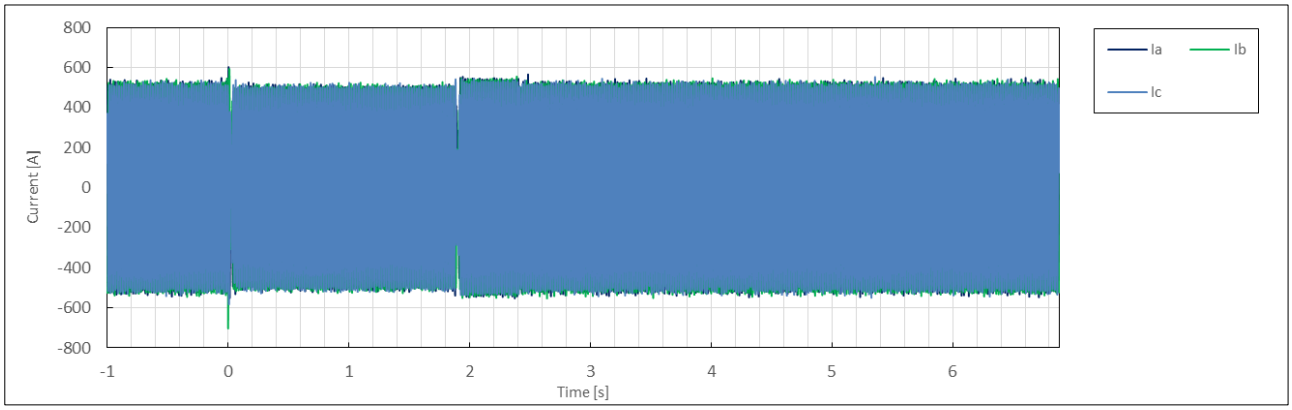
No. 3.1 Load Test

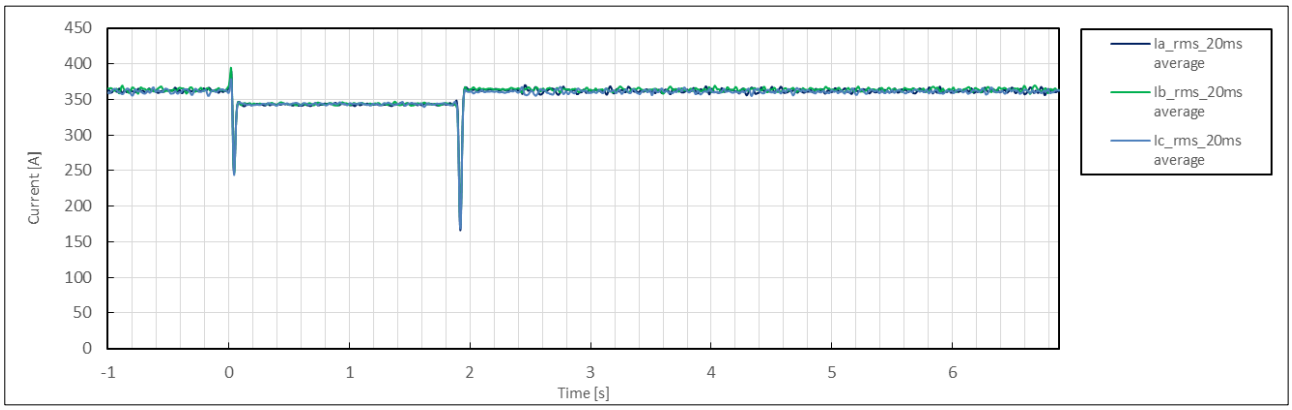


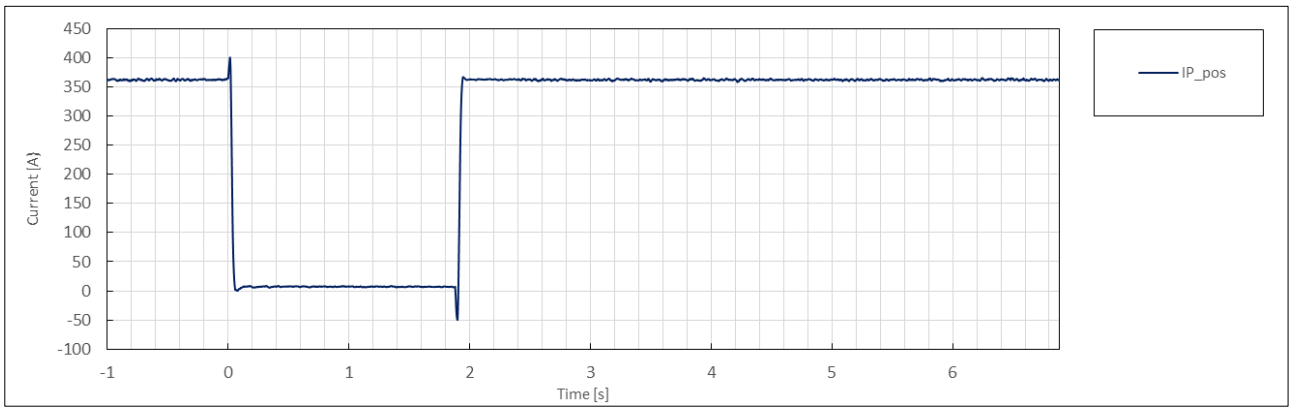


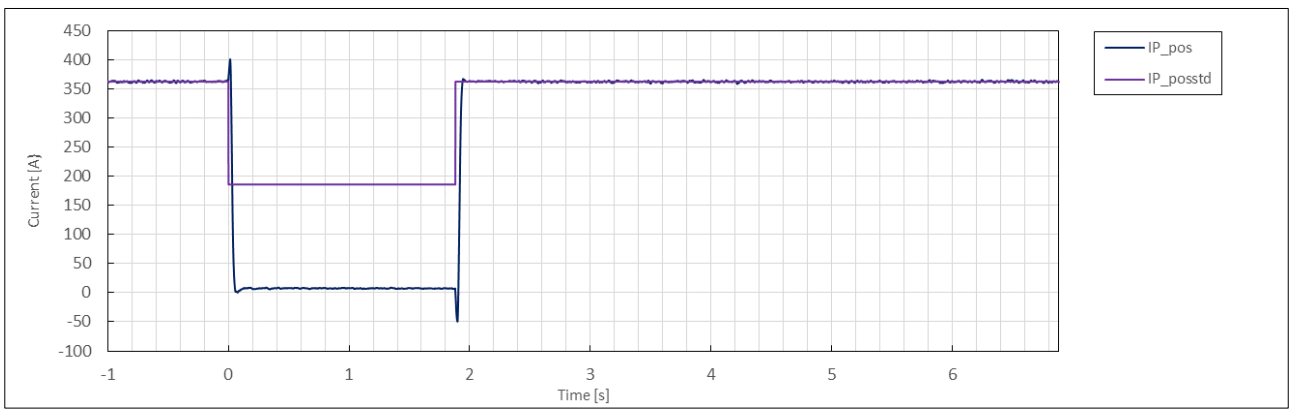


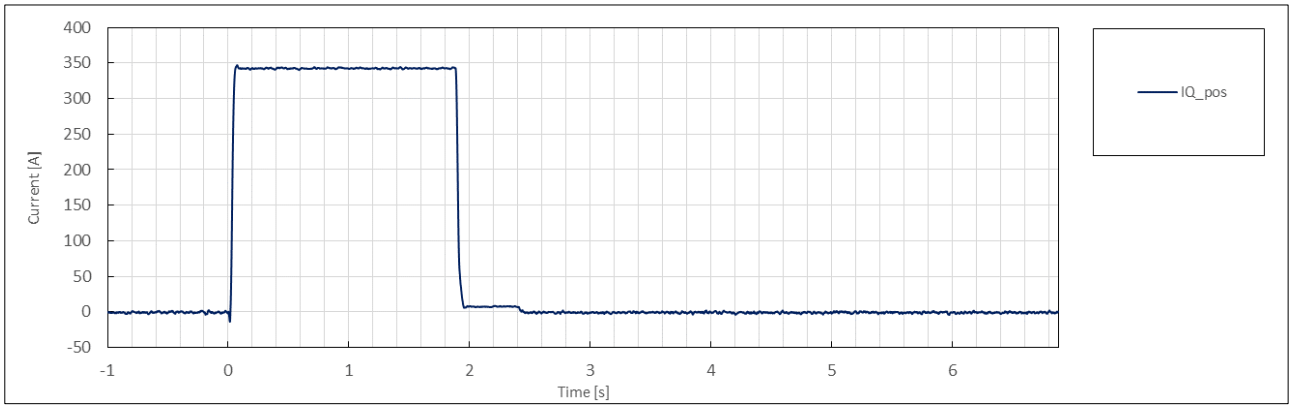


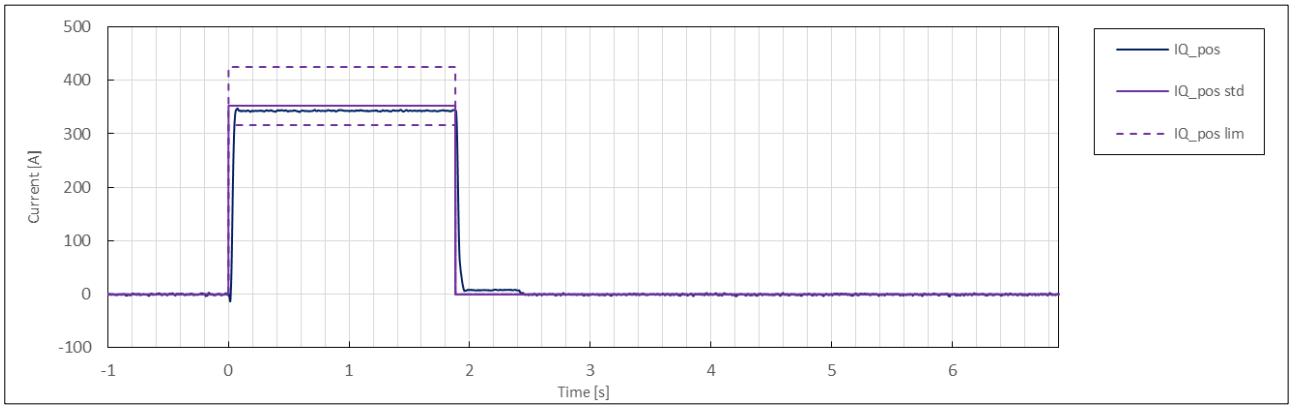

Current [A]
Time [s]
Ia
Ib
Ic

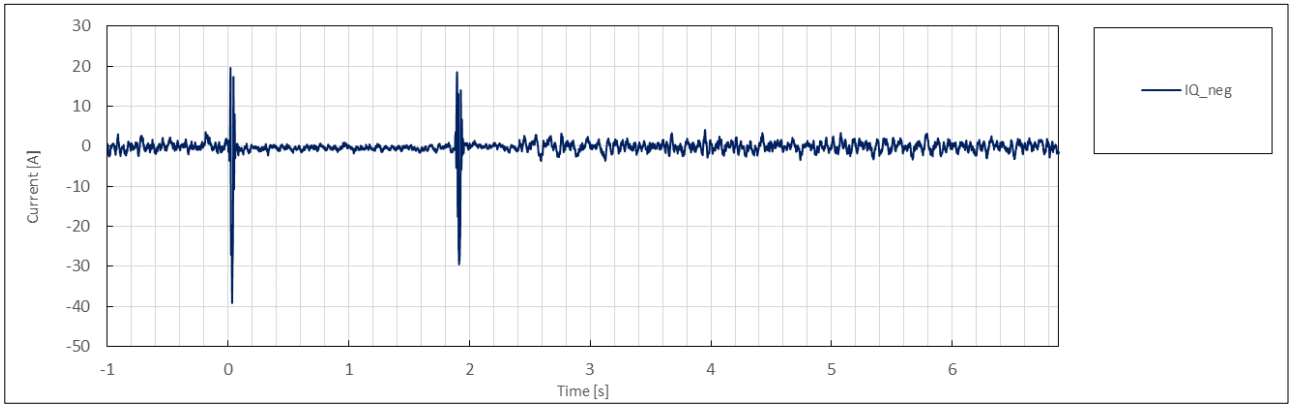

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

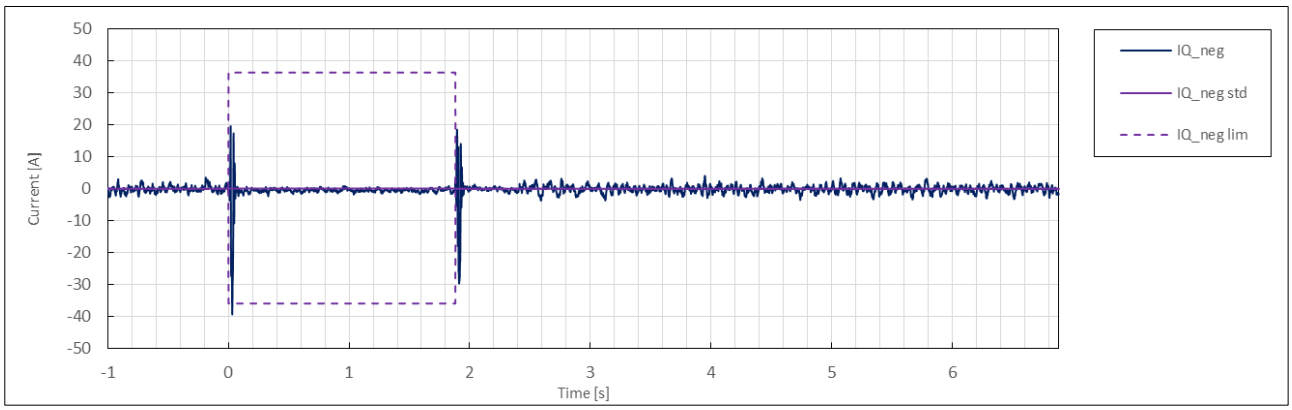

Current [A]
Time [s]
IP_pos

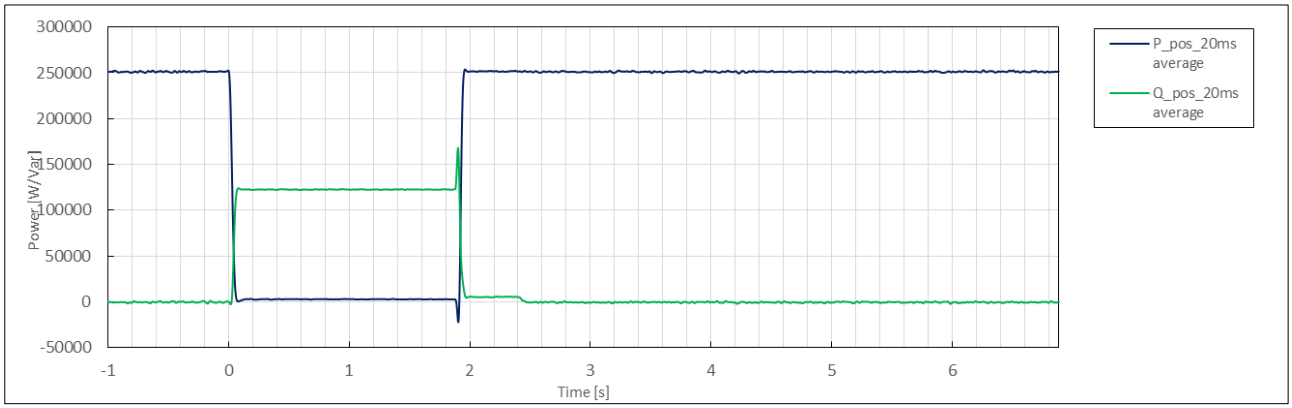

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

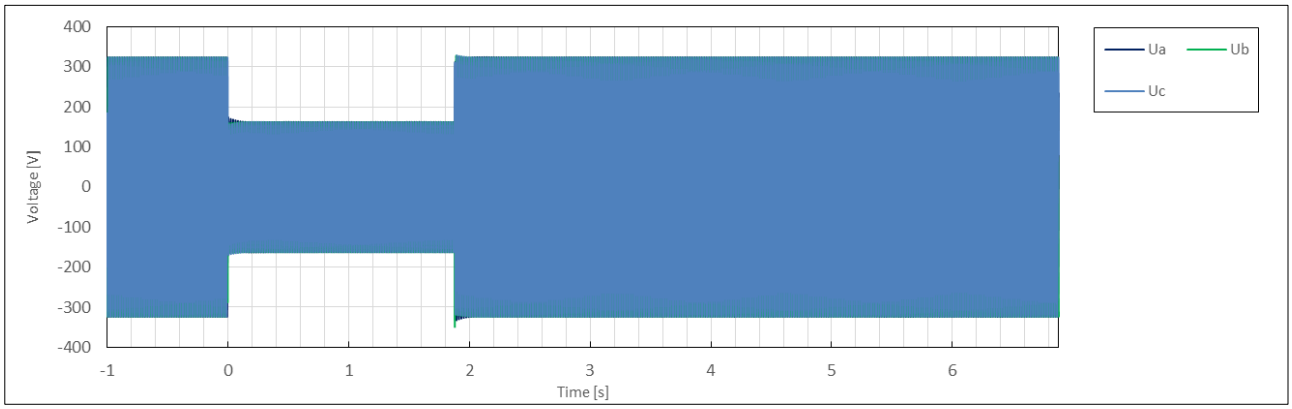

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

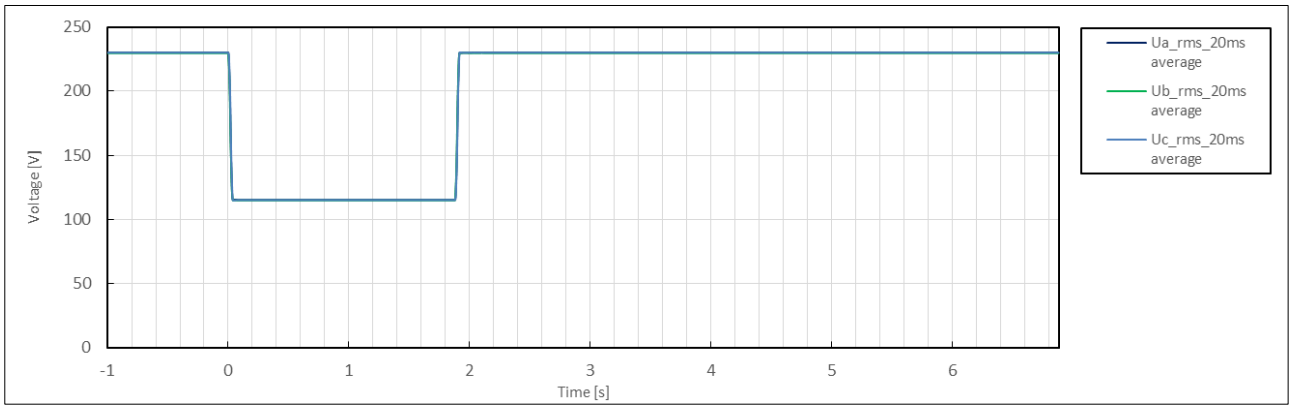

Current [A]
Time [s]
IQ_neg

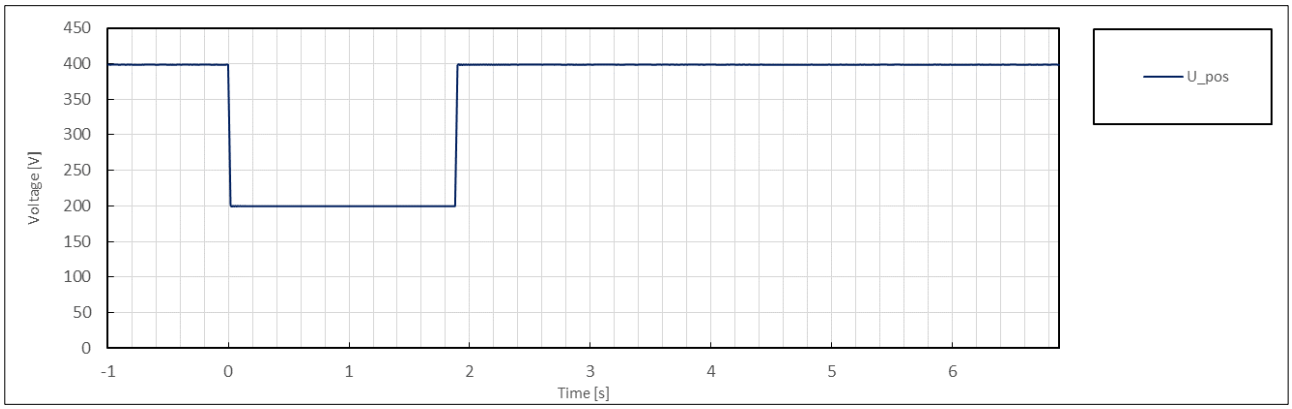

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
6
Time [s]
P_pos_20ms average
Q_pos_20ms average

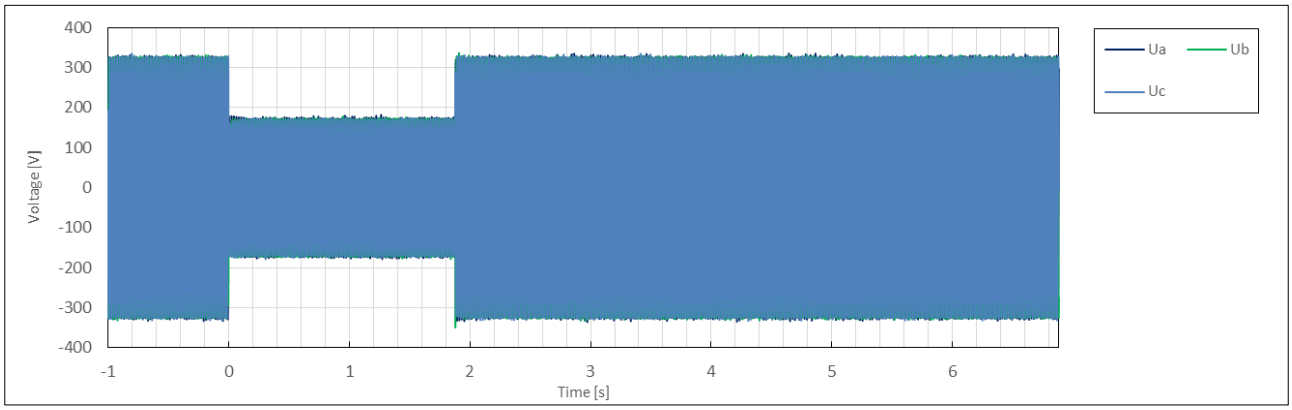
No. 3.2 Idle Test

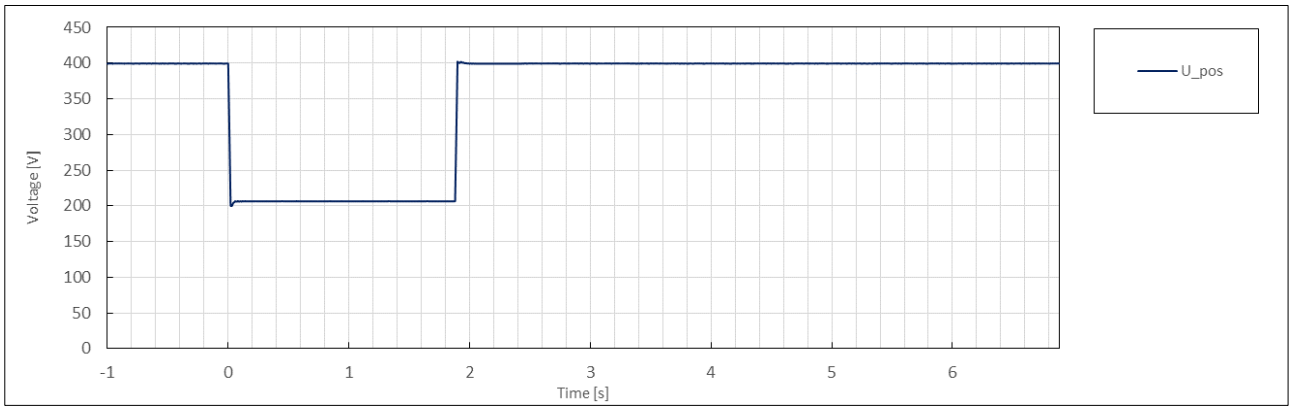


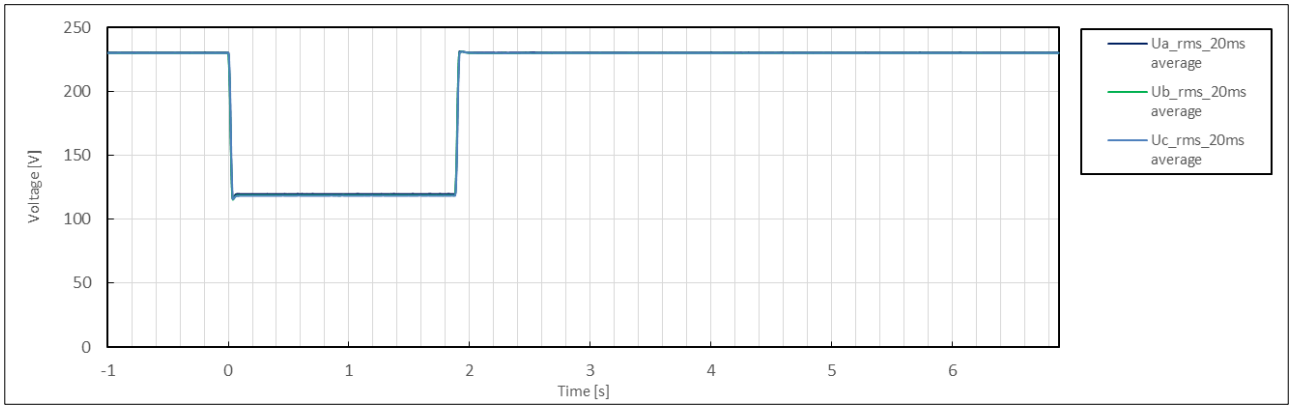


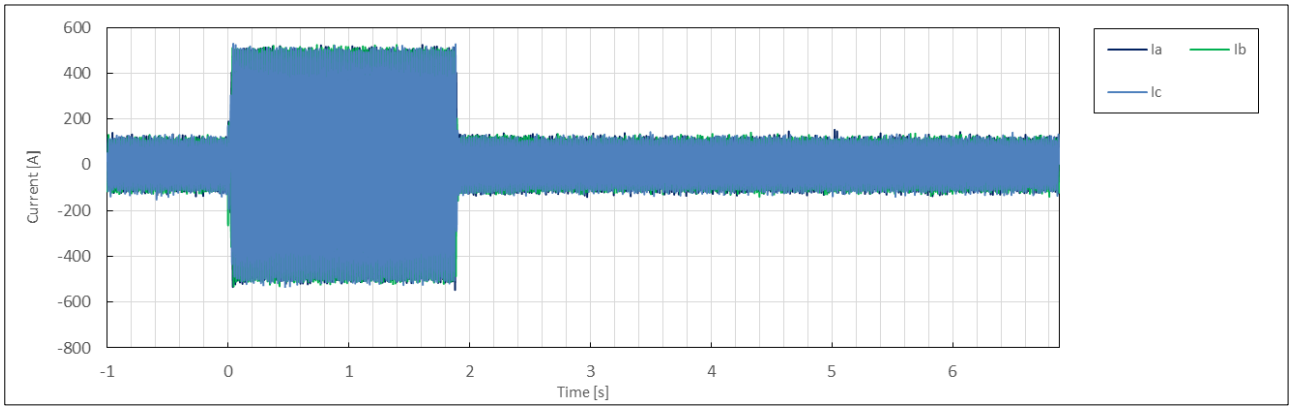


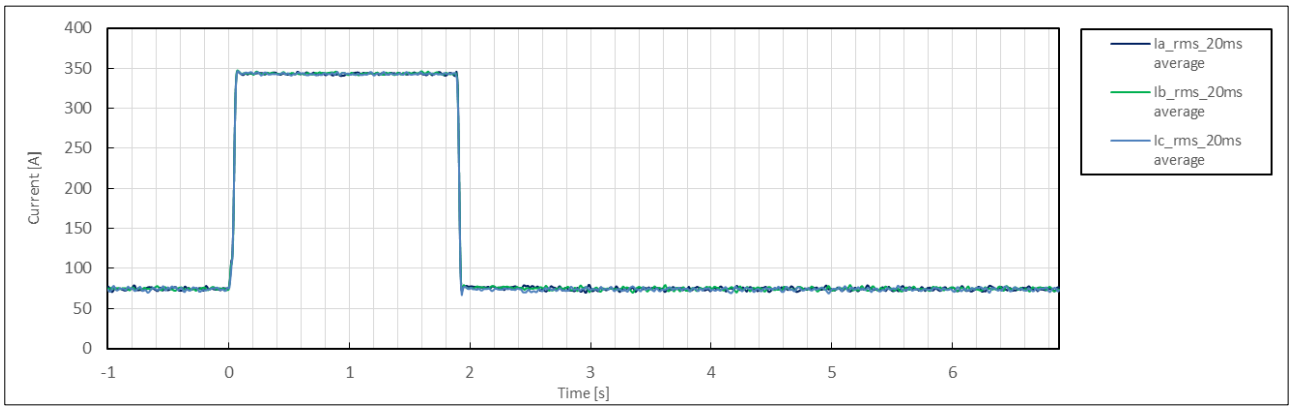
No. 3.2 Load Test

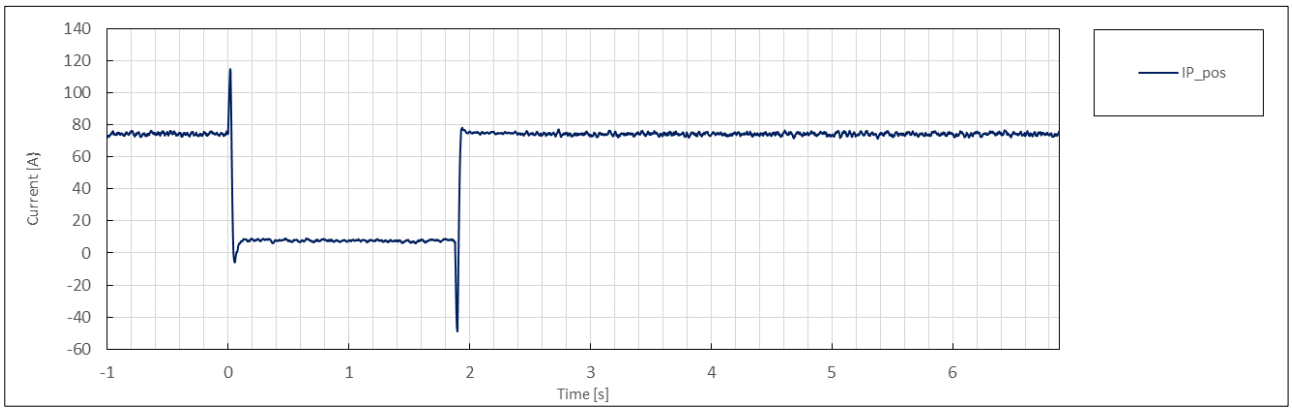


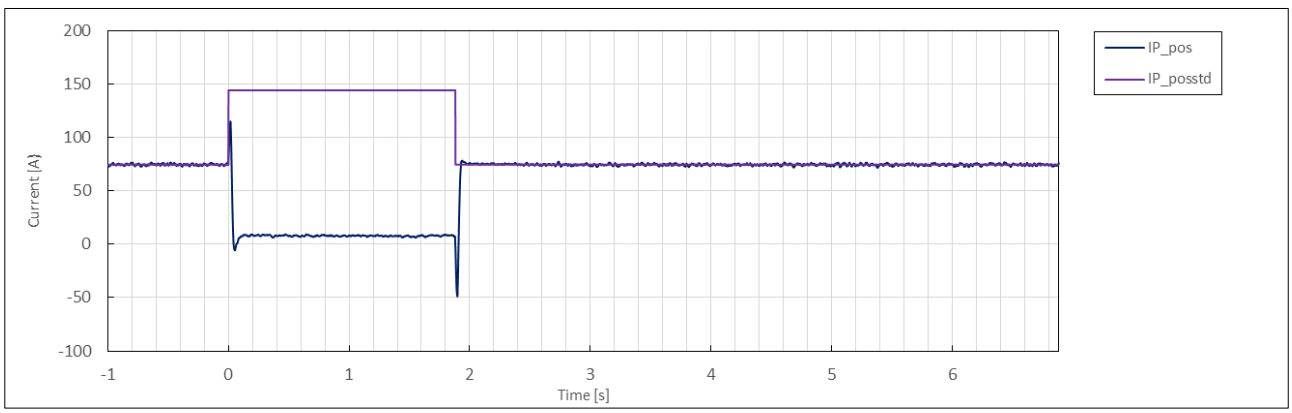


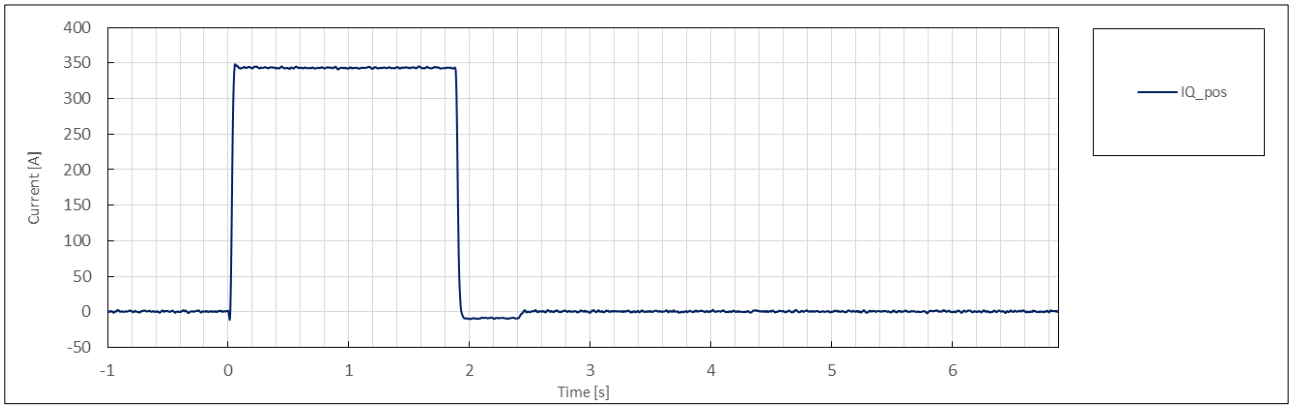


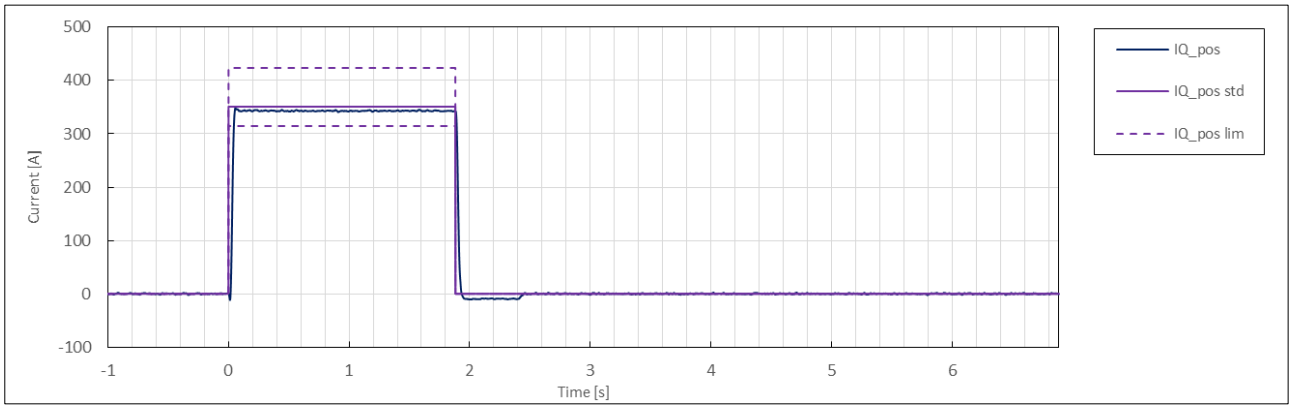

Current [A]
Time [s]
Ia
Ib
Ic

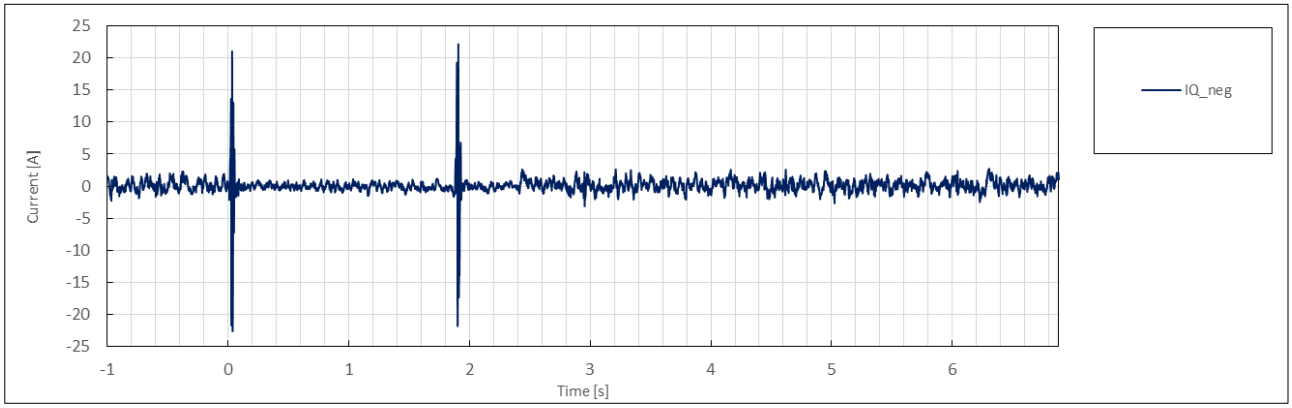

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

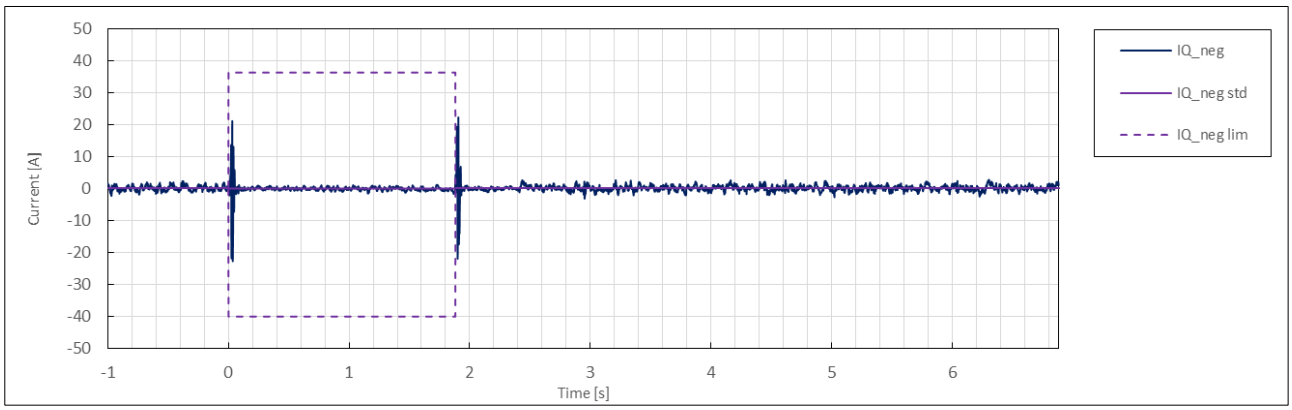

Current [A]
Time [s]
IP_pos

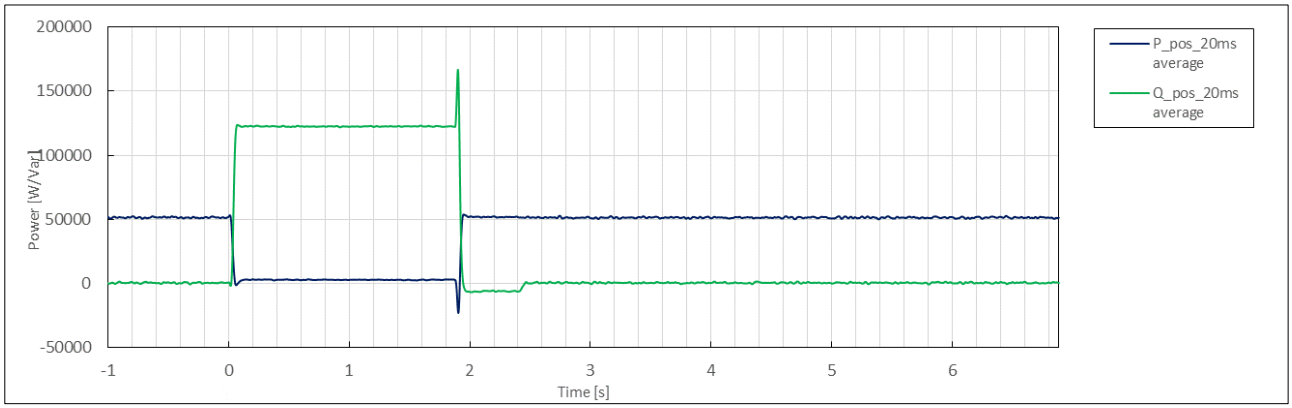

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

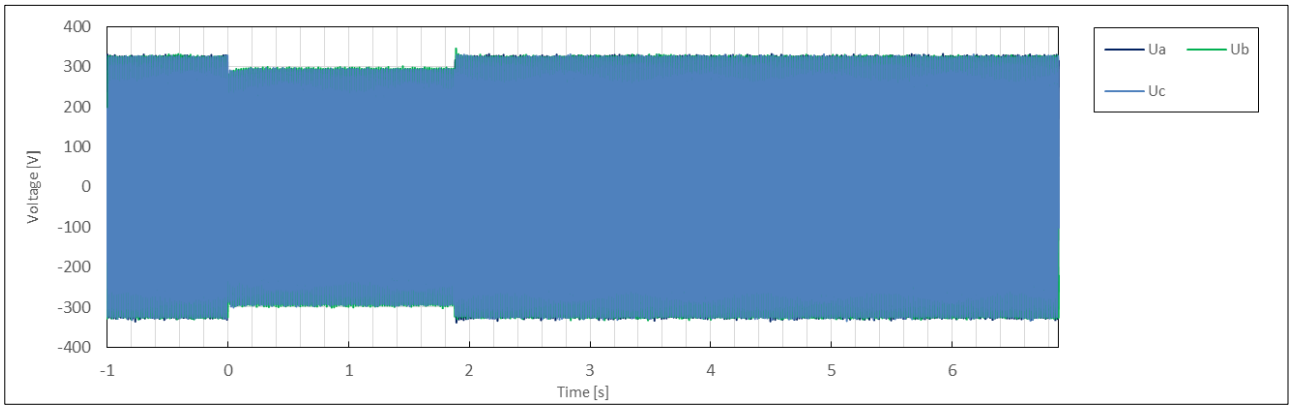

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

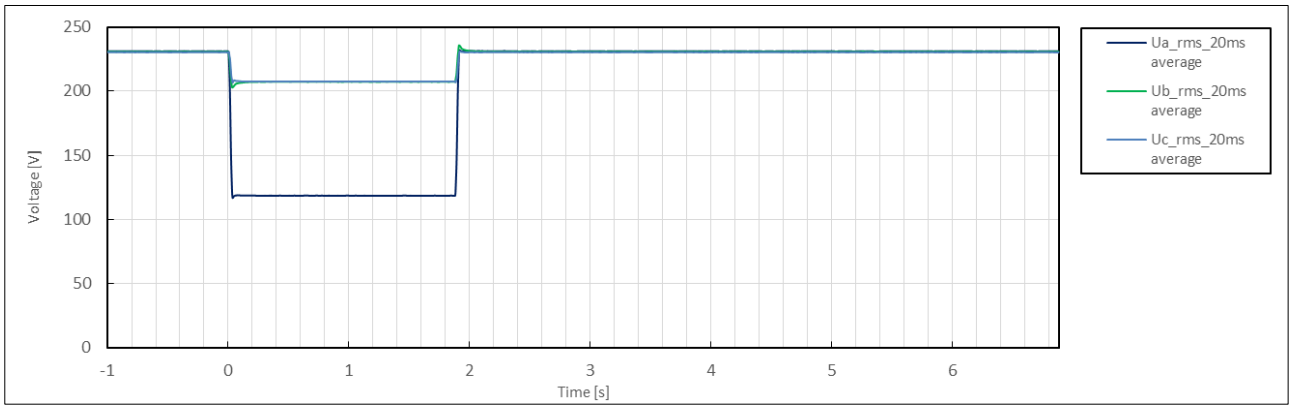

Current [A]
Time [s]
IQ_neg

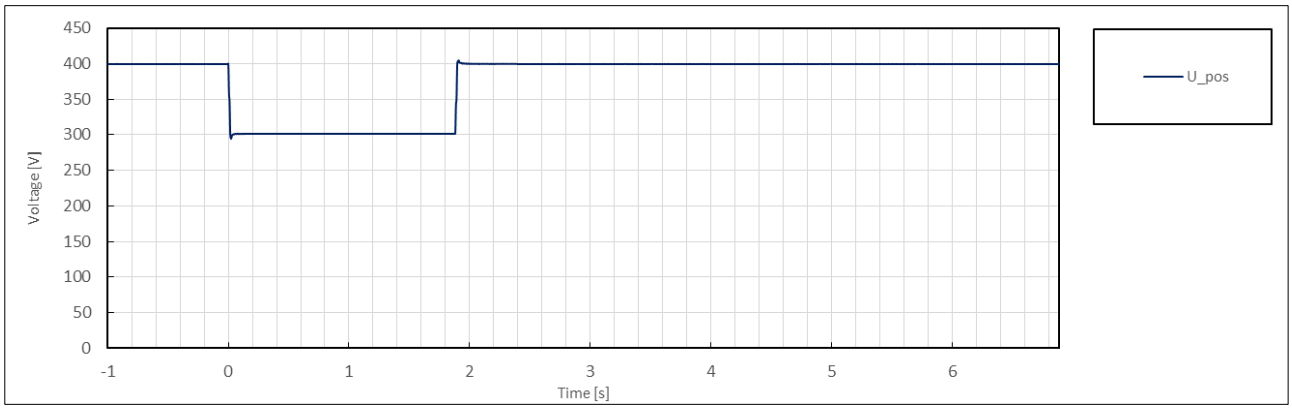

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
6
Time [s]
P_pos_20ms average
Q_pos_20ms average

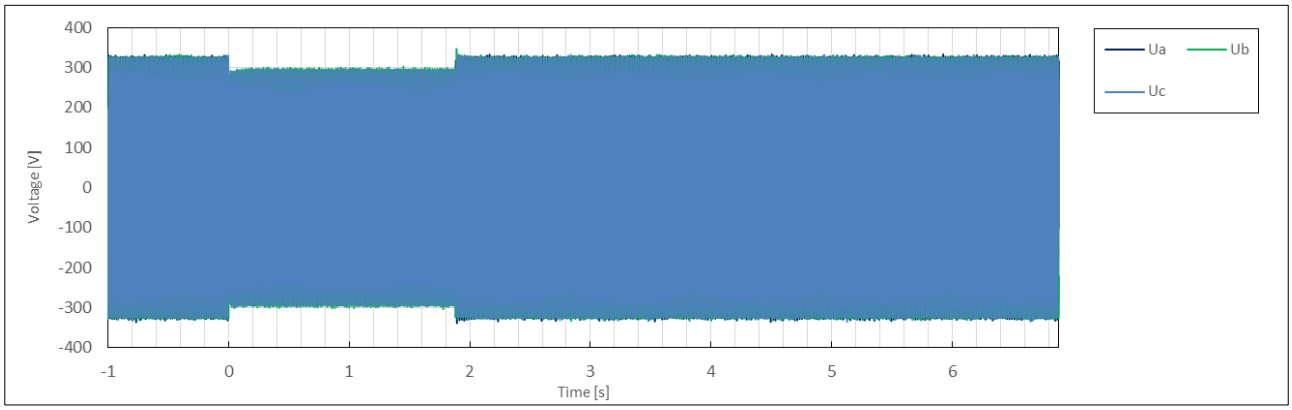
No. 3.3 Idle Test

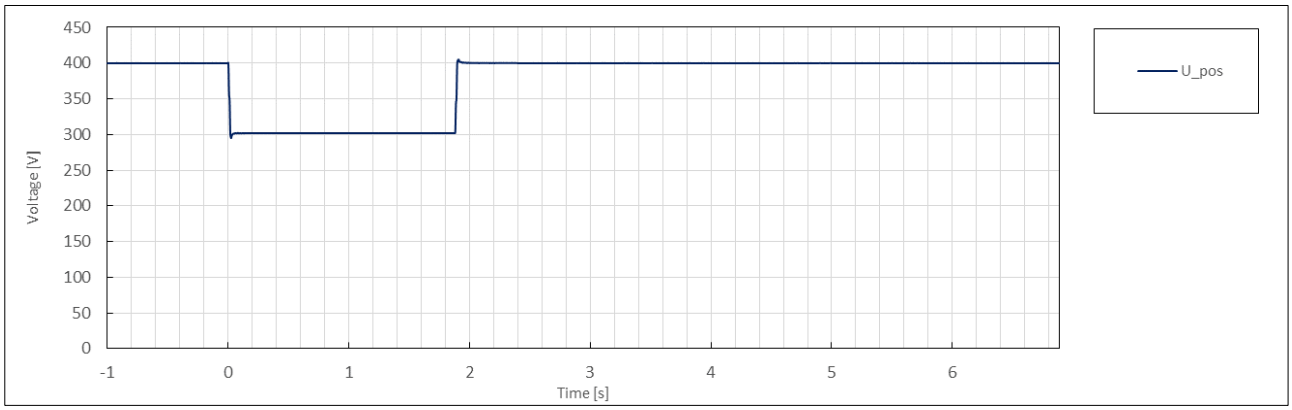


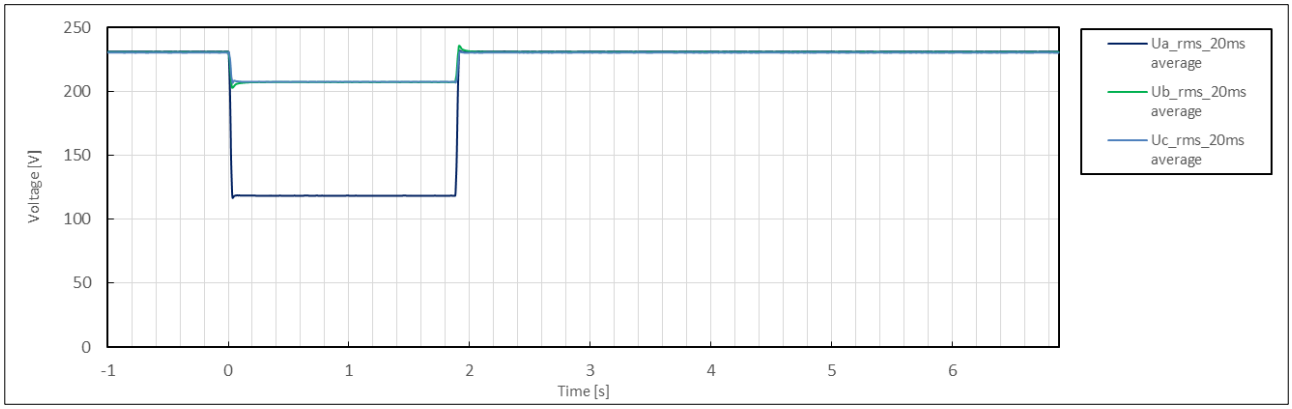


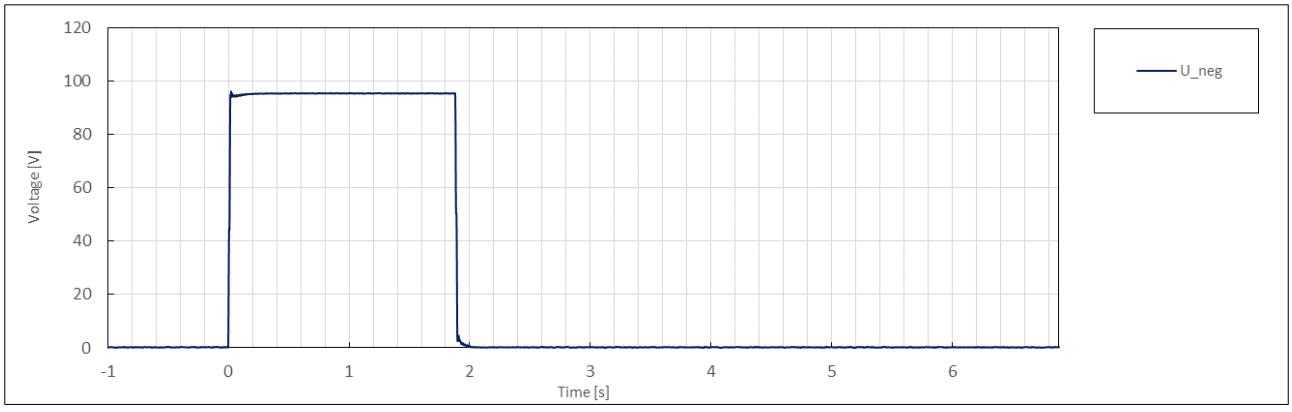


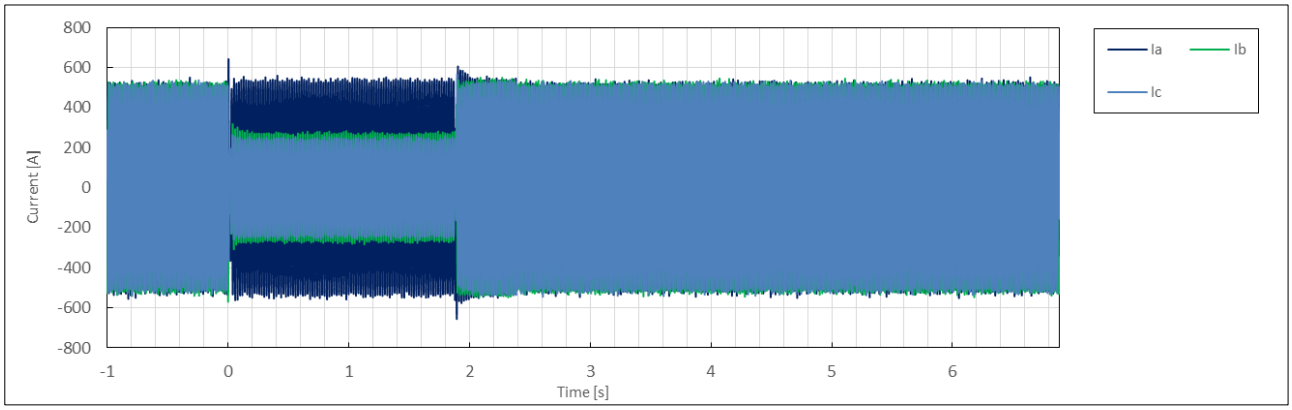
No. 3.3 Load Test

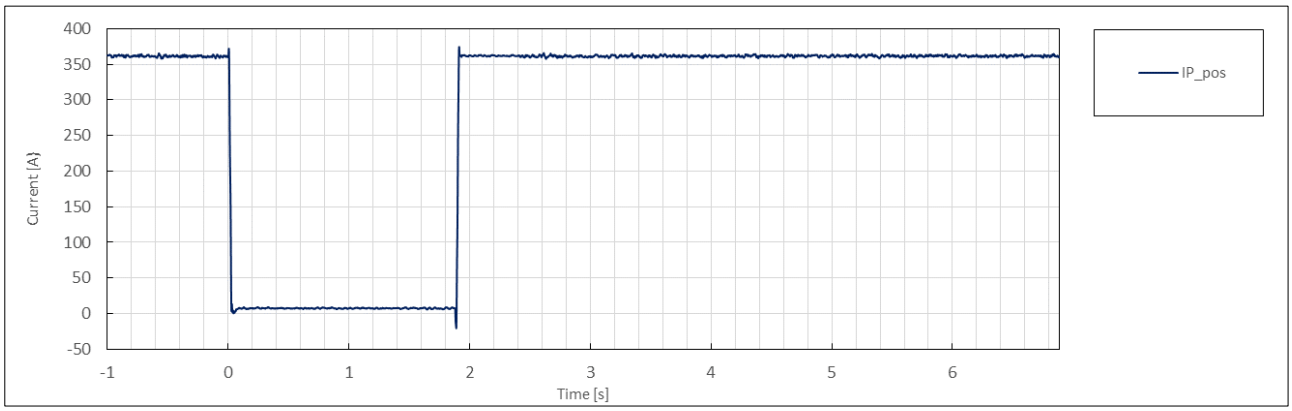


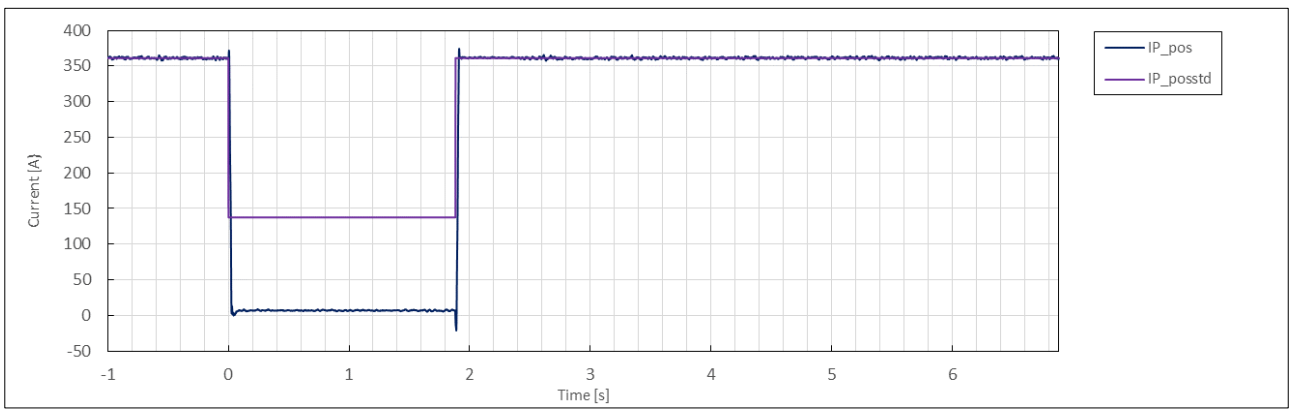


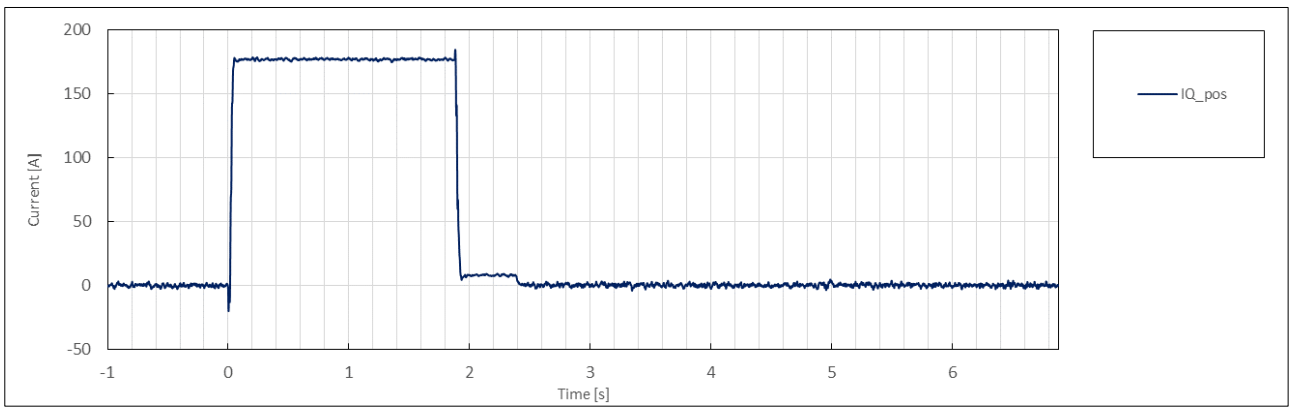


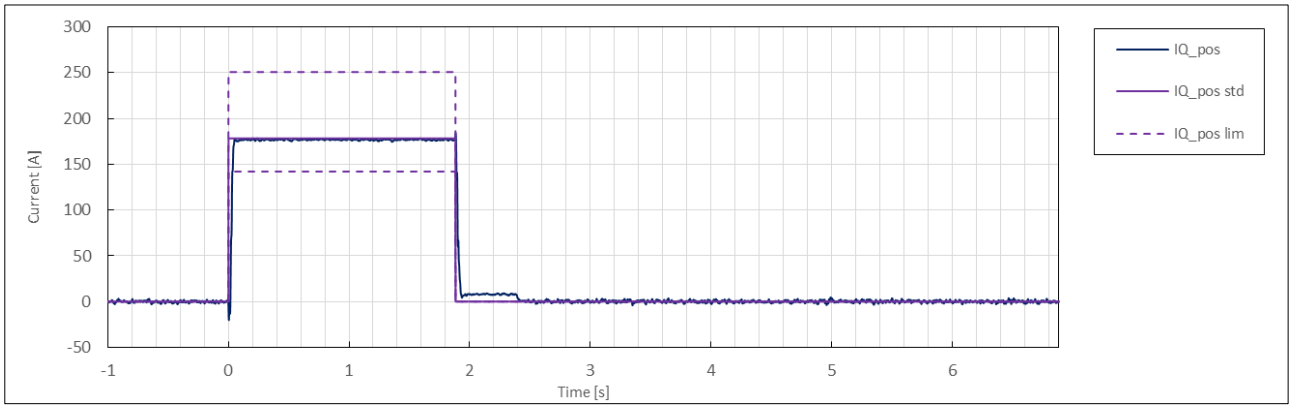


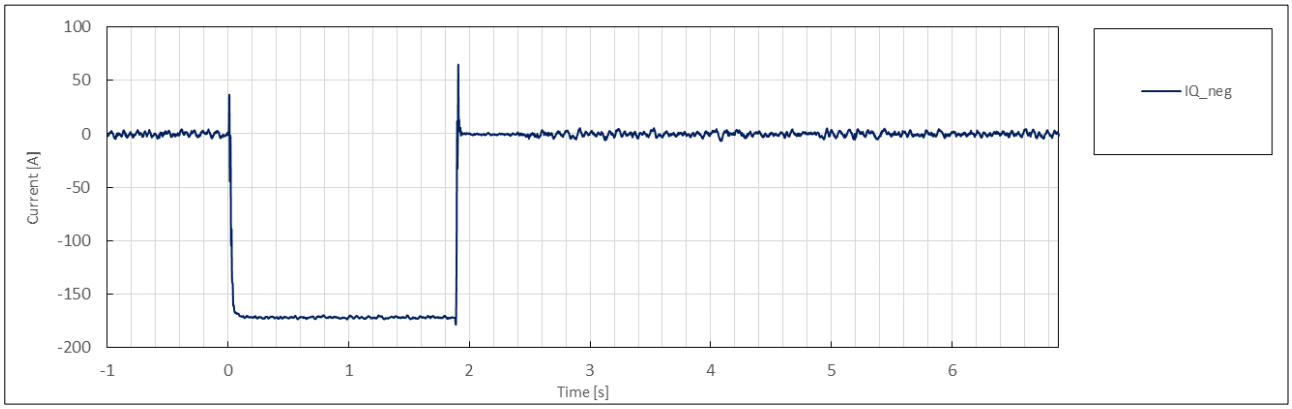

Current [A]
Time [s]
Ia
Ib
Ic

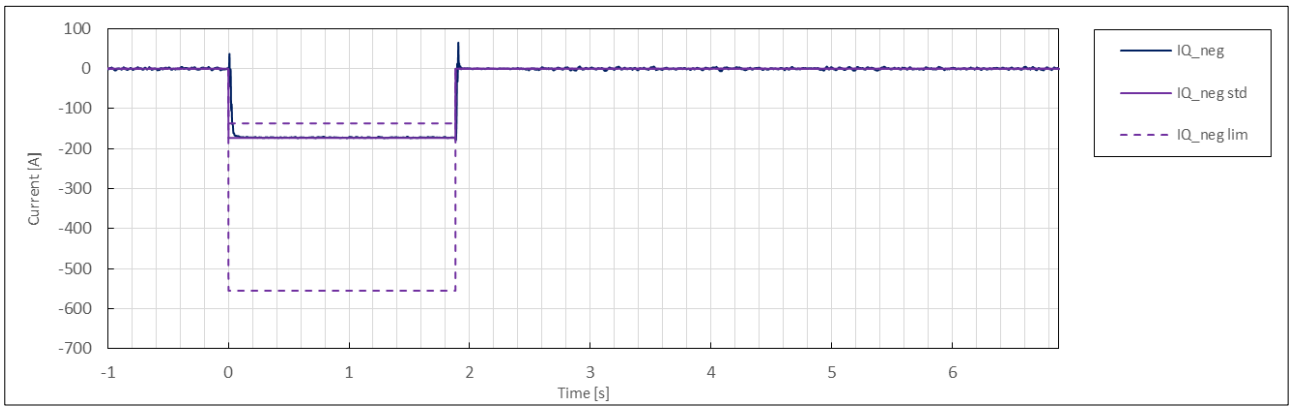

Current [A]
Time [s]
IP_pos

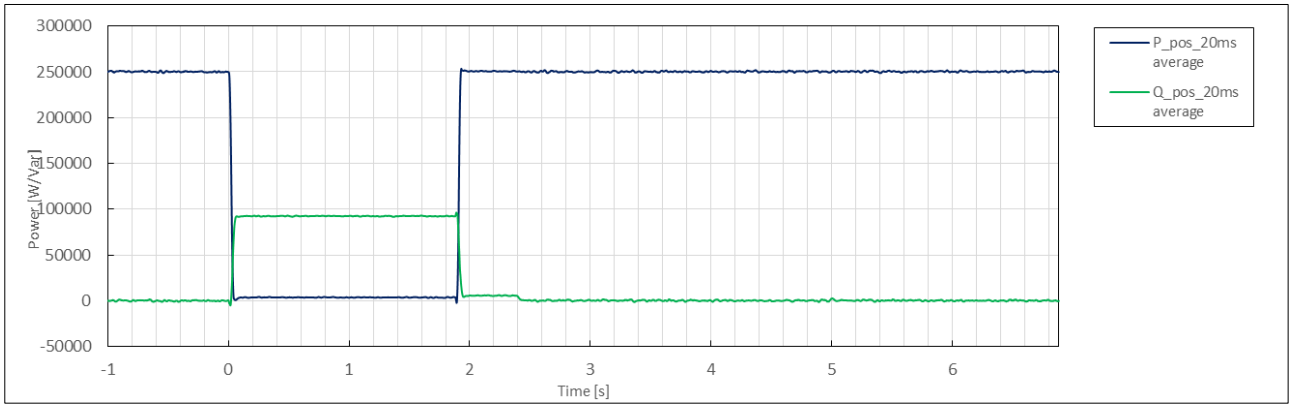

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

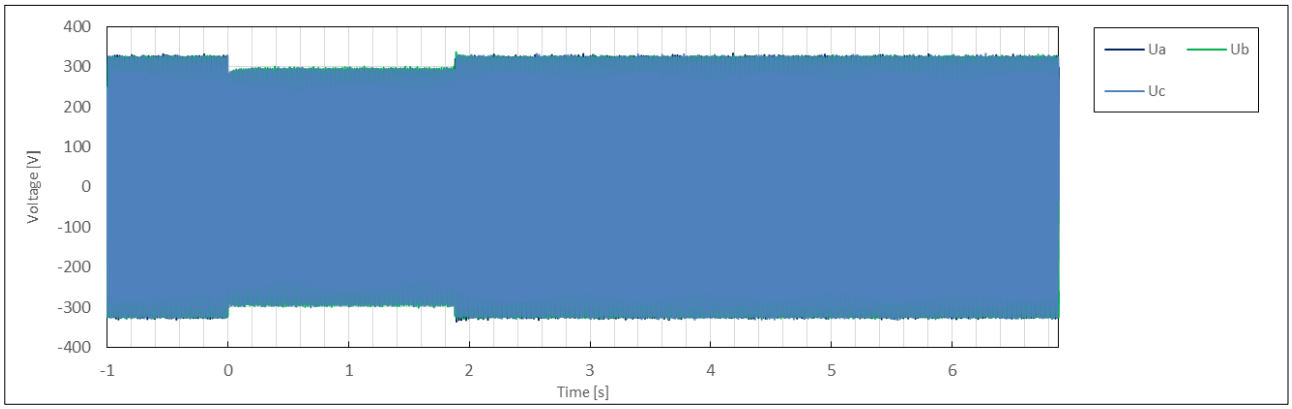

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

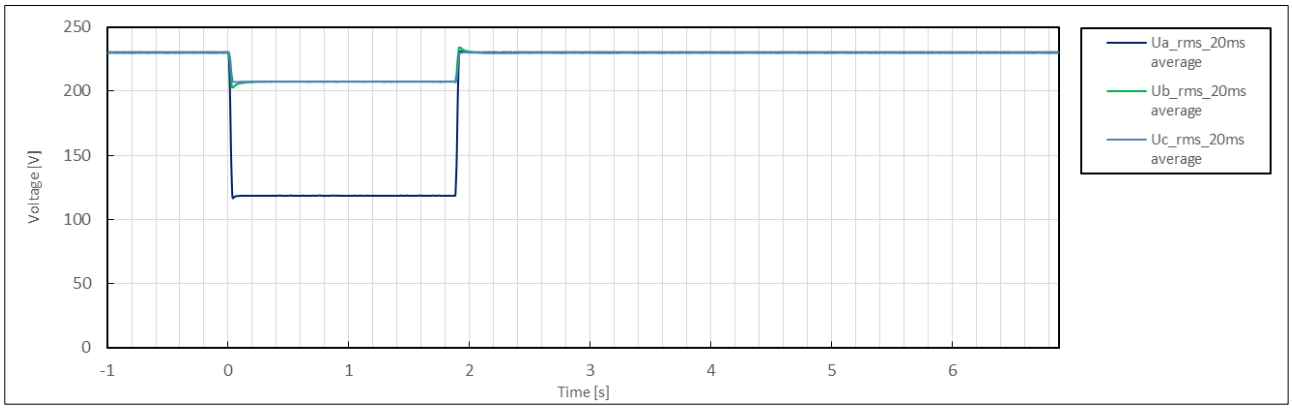

Current [A]
Time [s]
IQ_neg

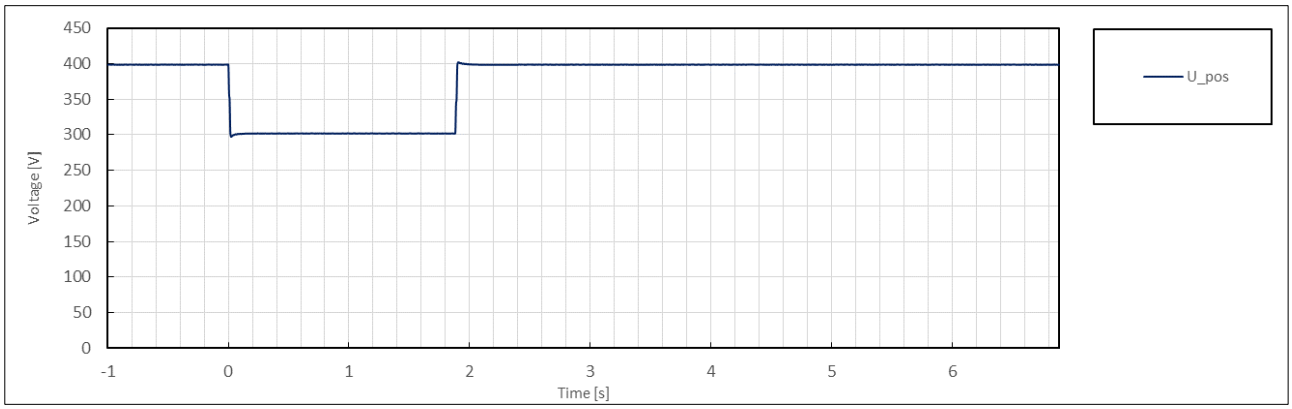

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


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

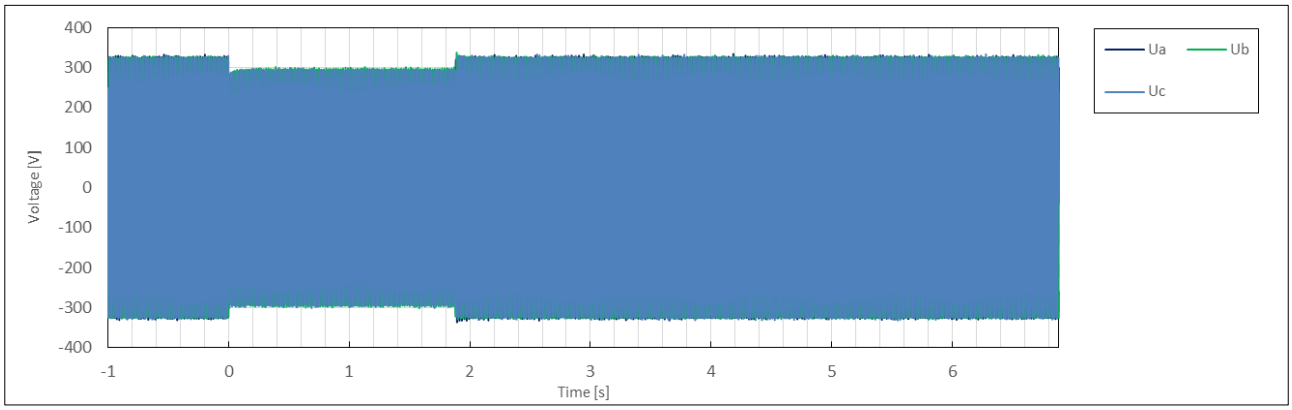
No. 3.4 Idle Test

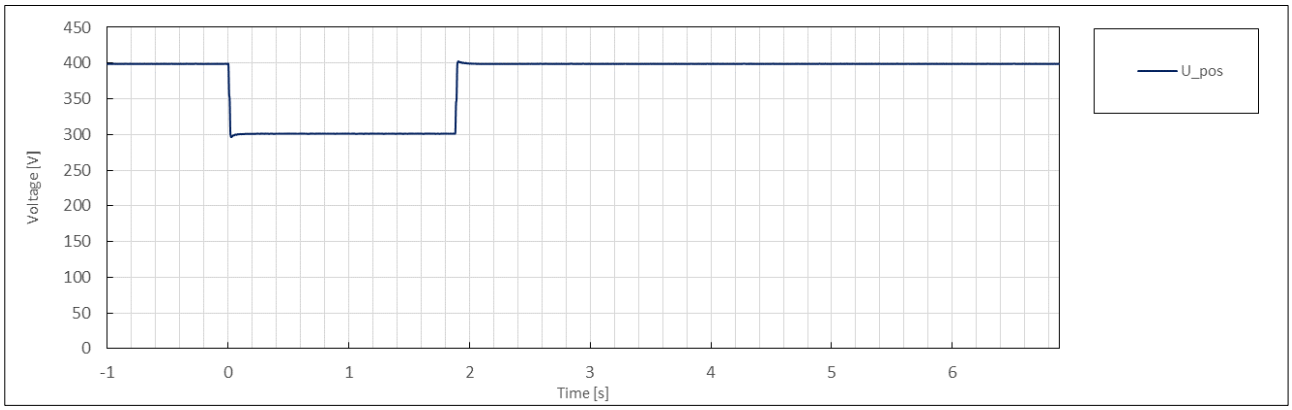


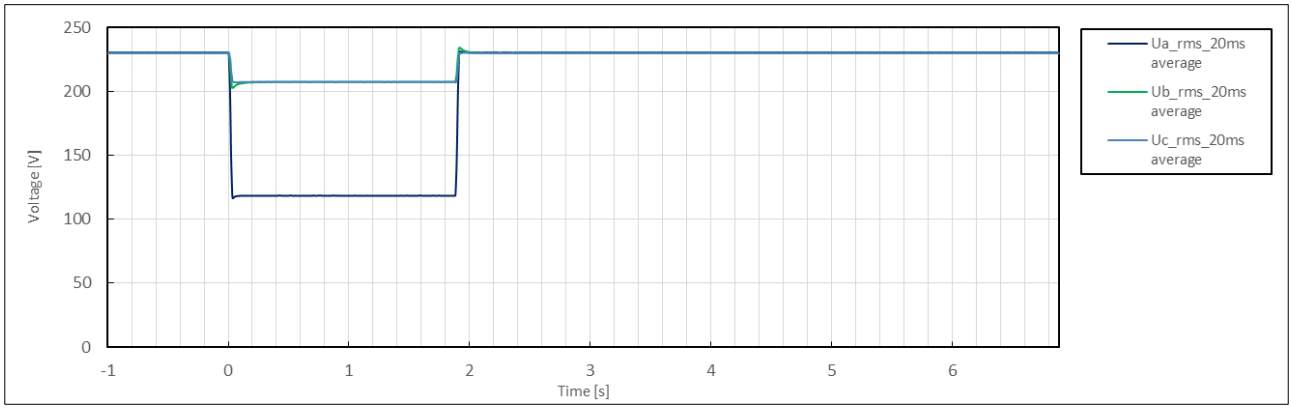


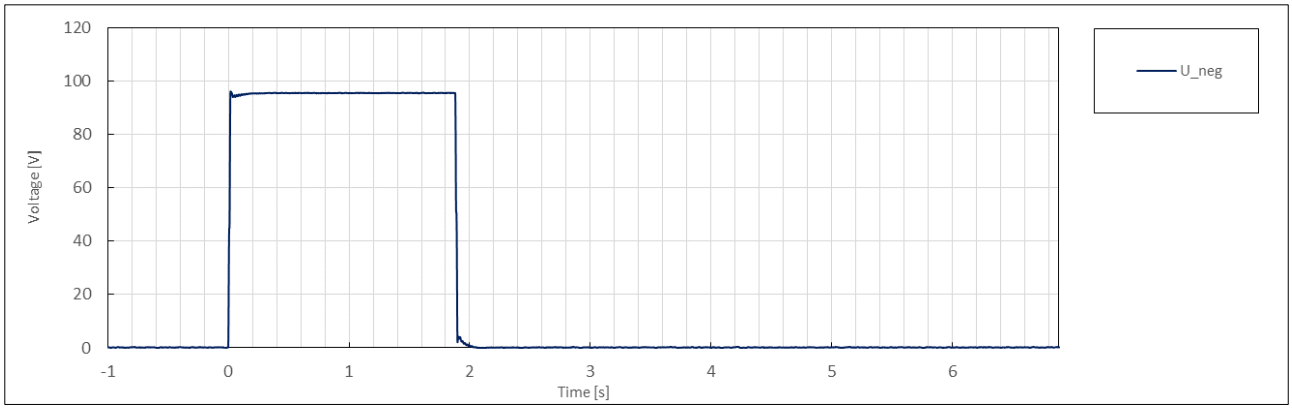


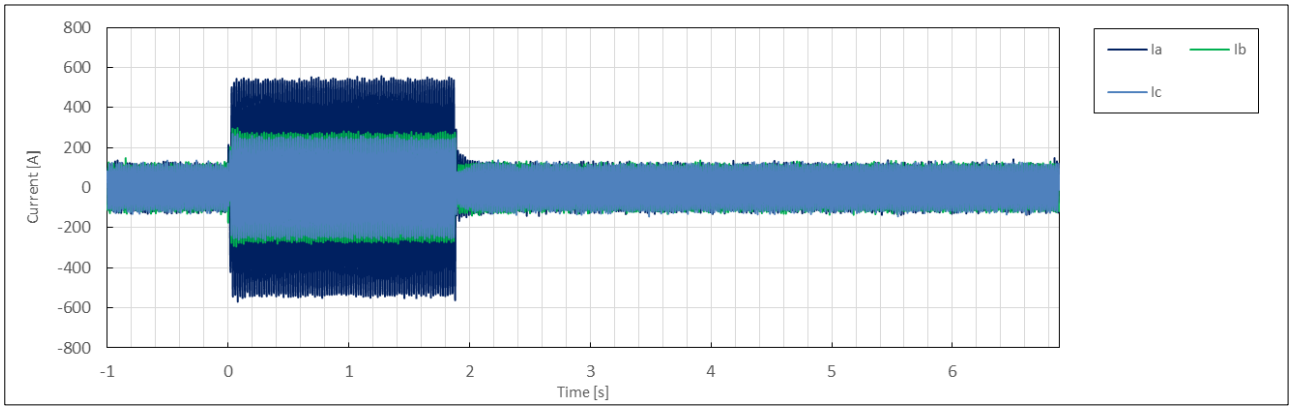
No. 3.4 Load Test

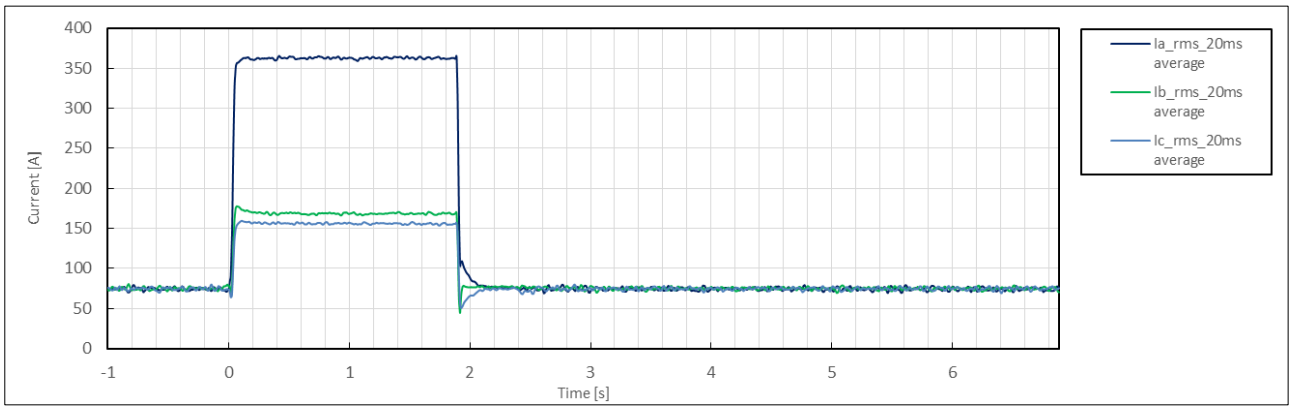


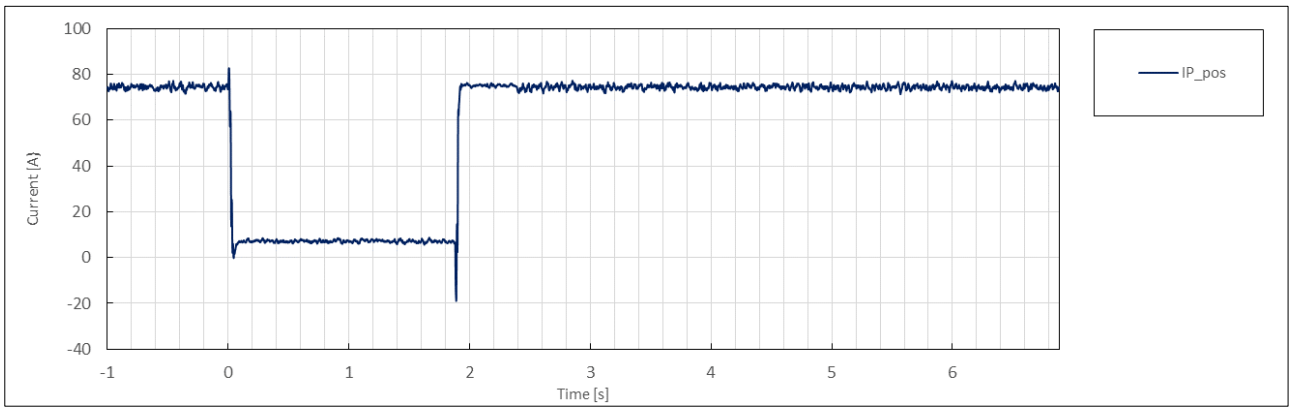


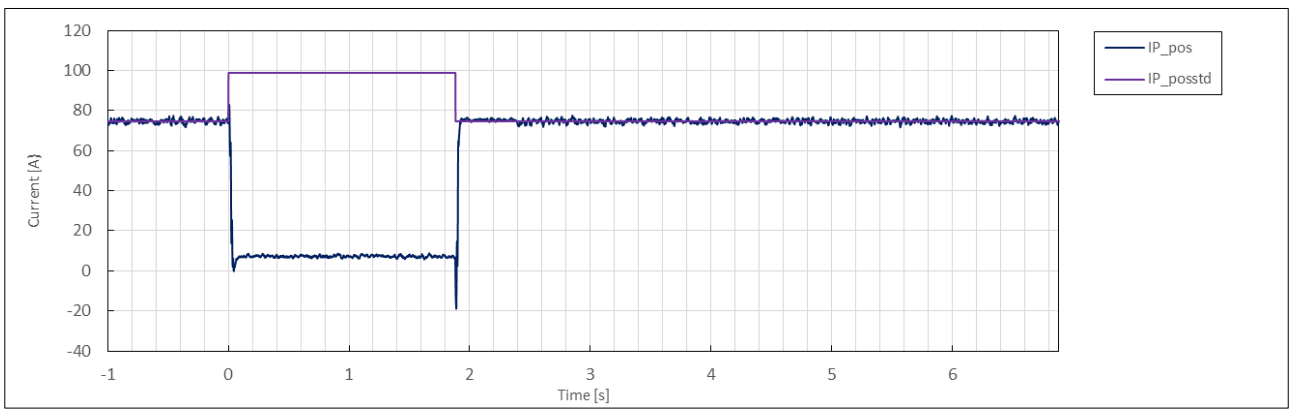


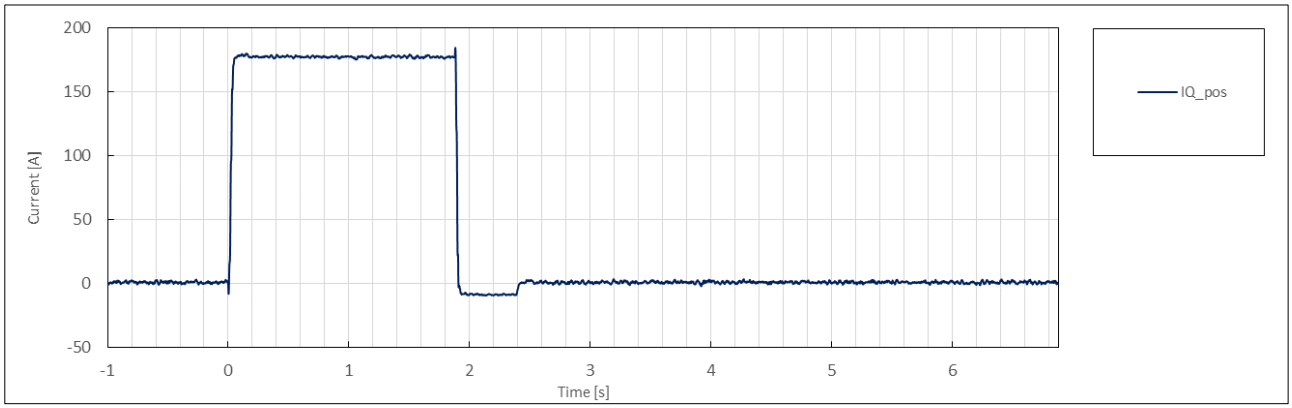


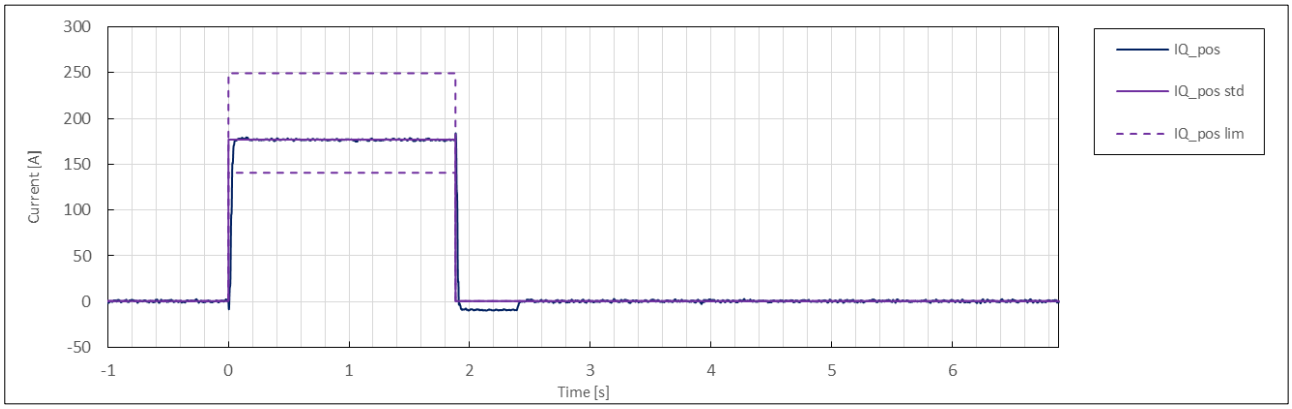

Current [A]
Time [s]
Ia
Ib
Ic

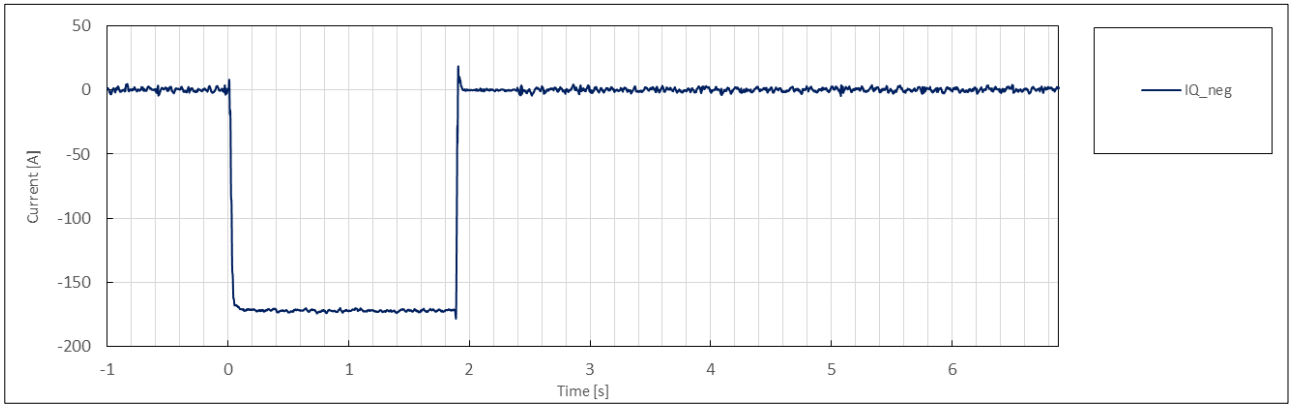

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

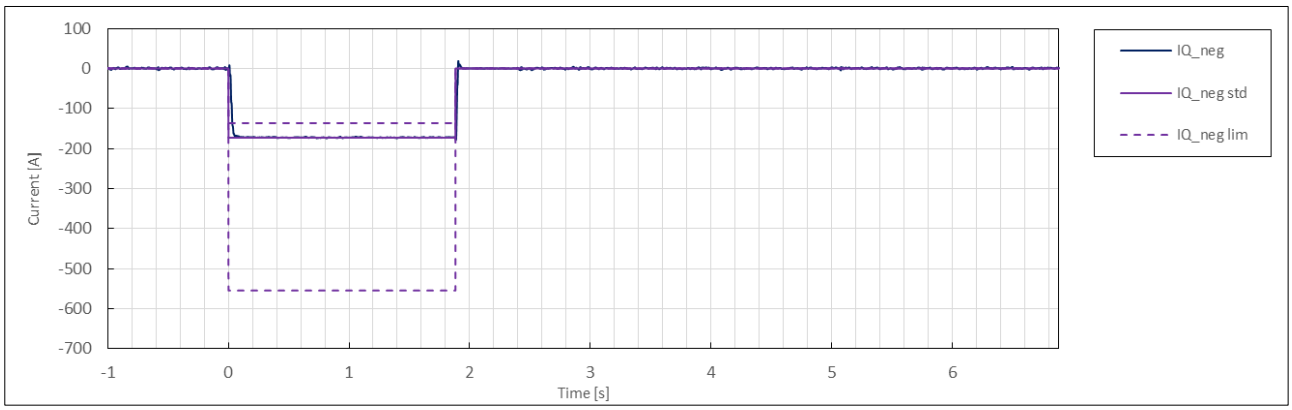

Current [A]
Time [s]
IP_pos

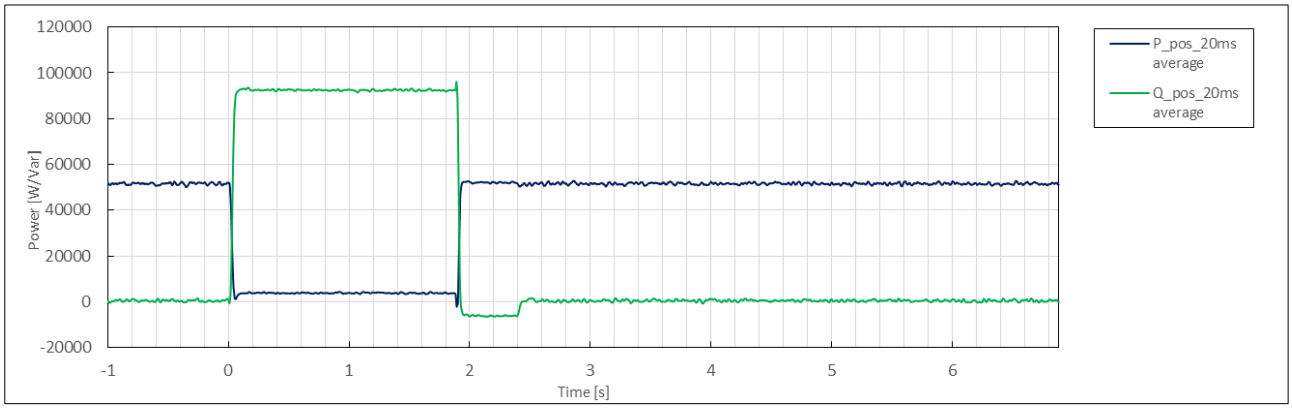

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

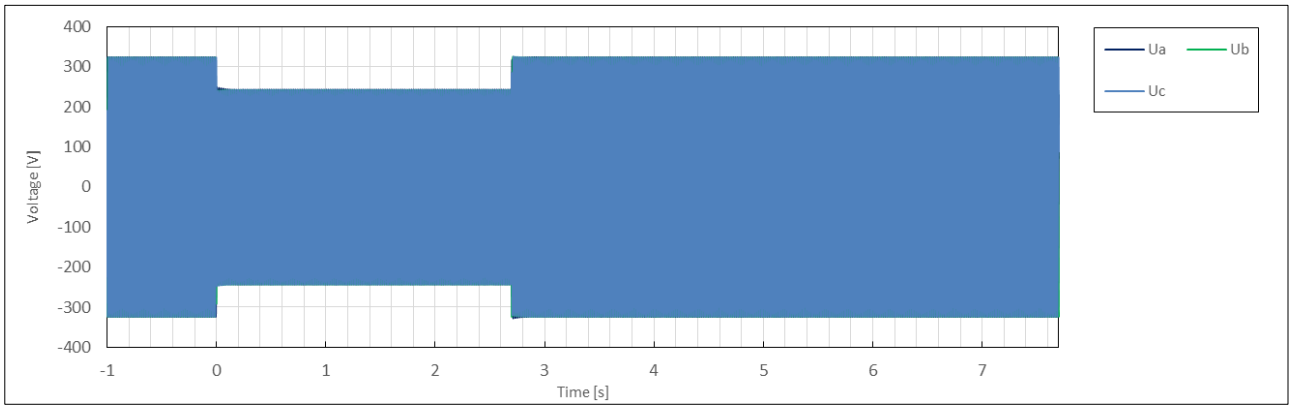

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

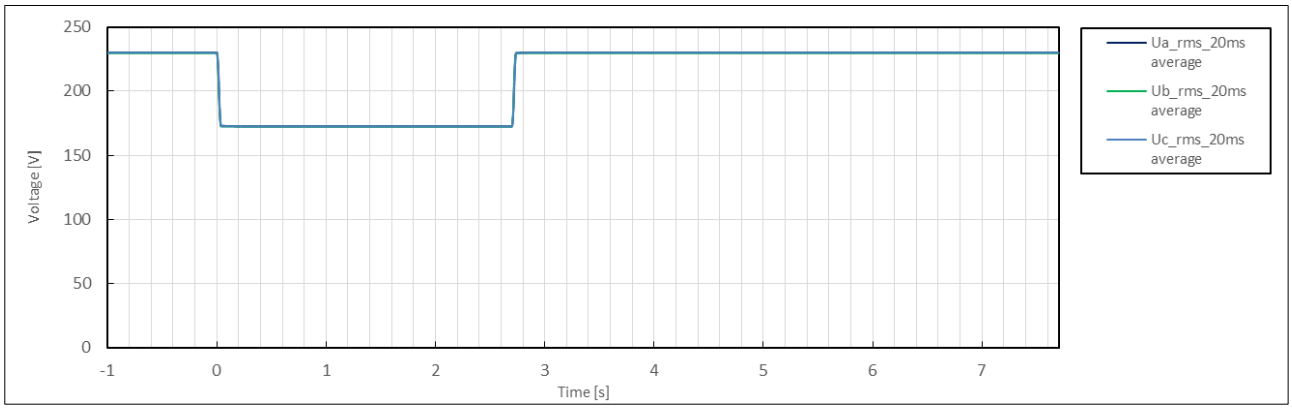

Current [A]
Time [s]
IQ_neg

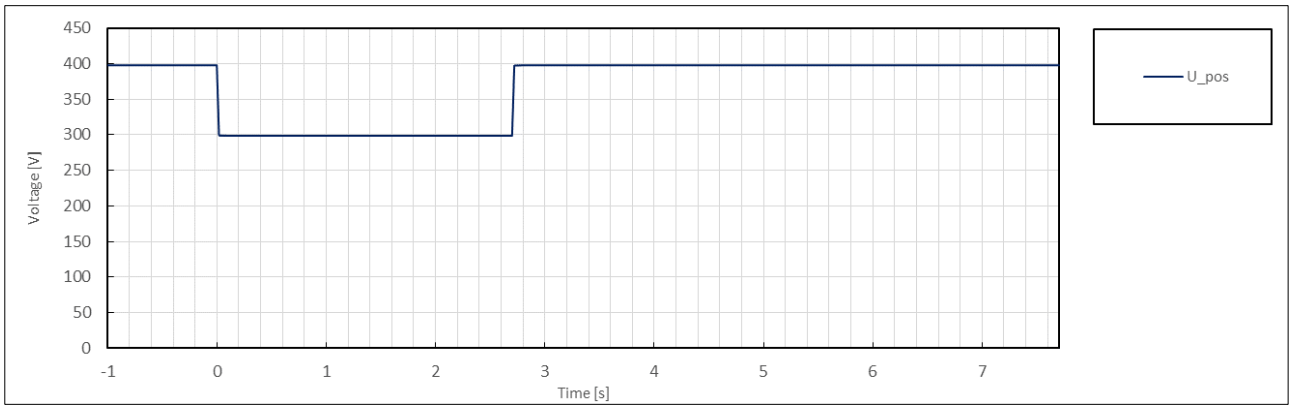

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


120000
100000
80000
60000
40000
20000
0
-20000
Power [W/Var]
-1
0
1
2
3
4
5
6
Time [s]
P_pos_20ms average
Q_pos_20ms average

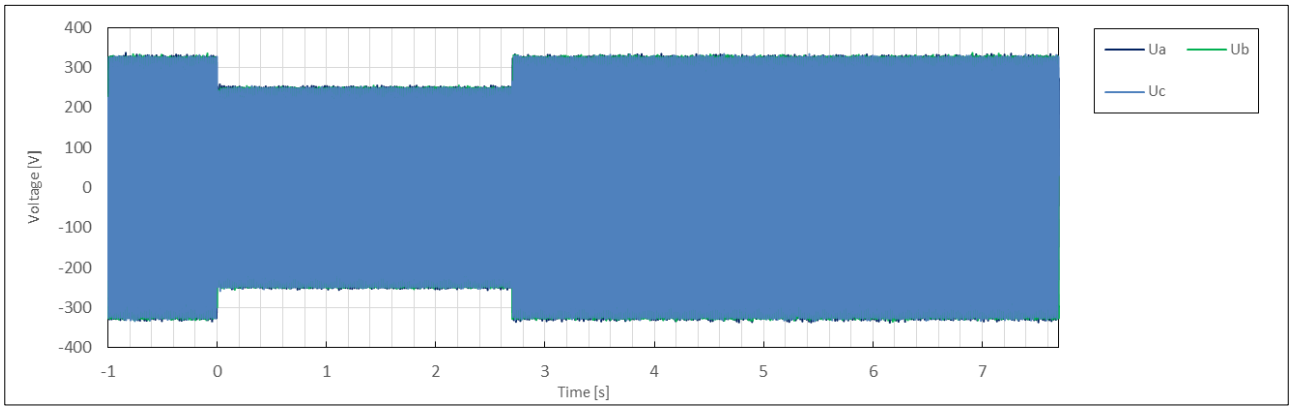
No. 4.1 Idle Test

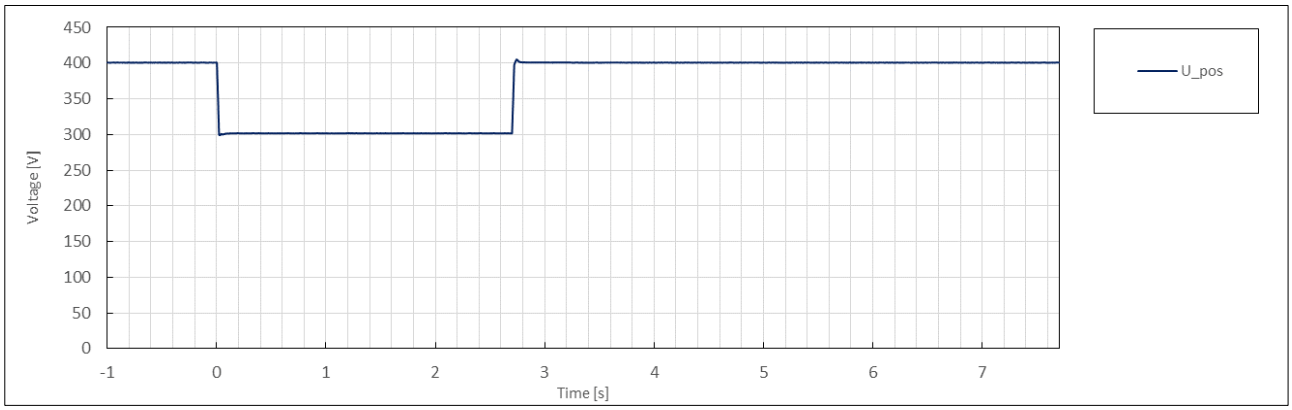


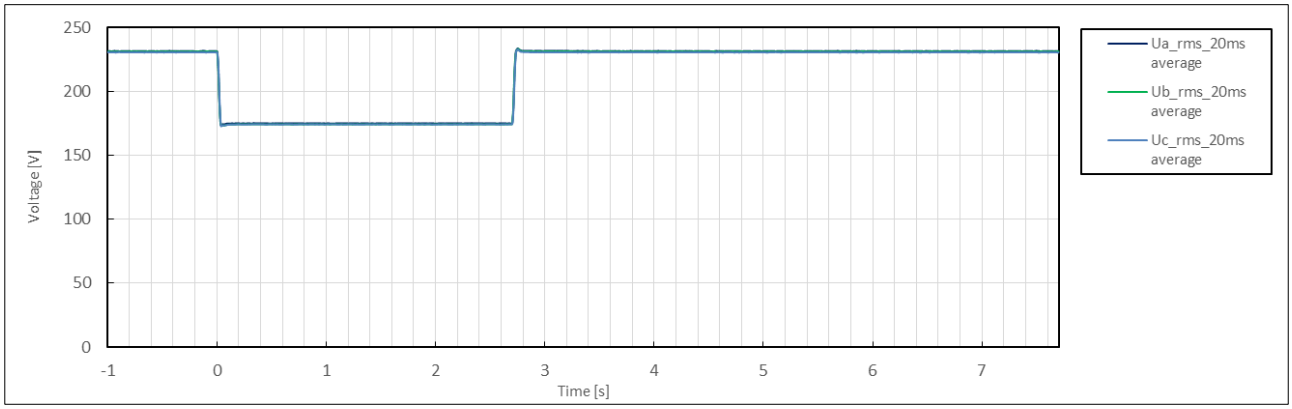


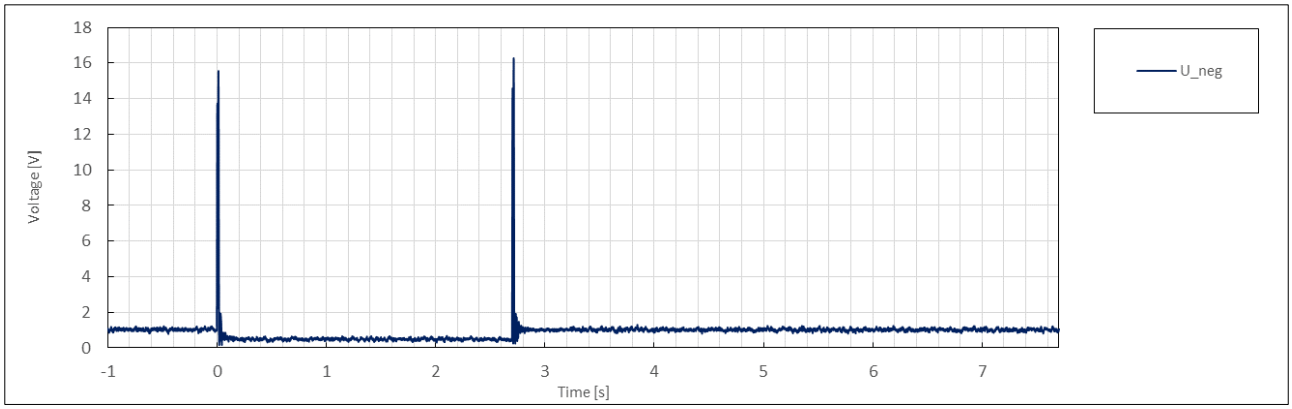


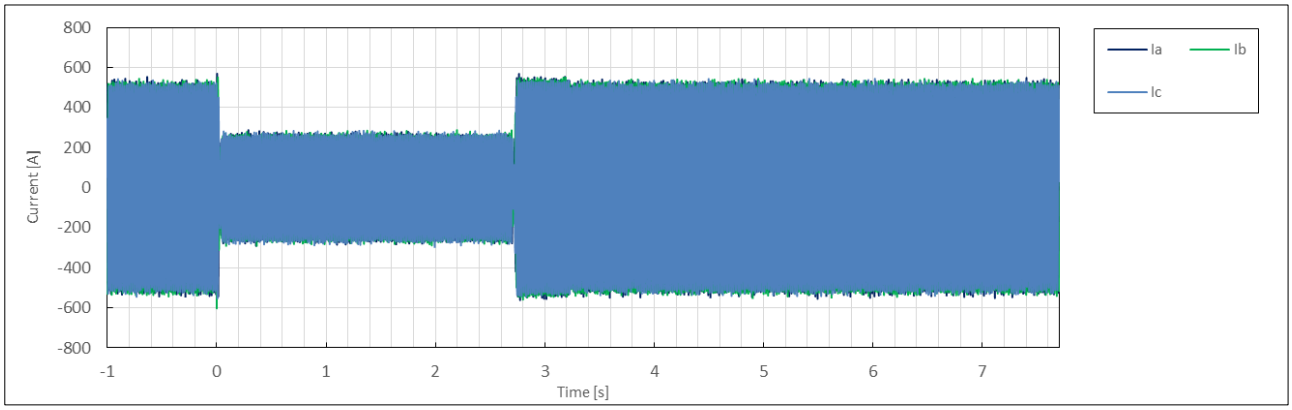
No. 4.1 Load Test

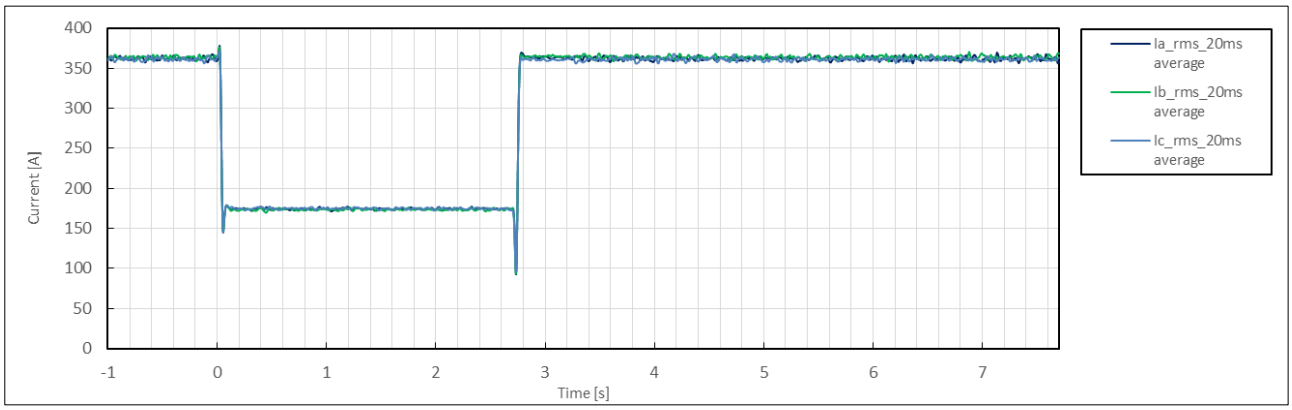


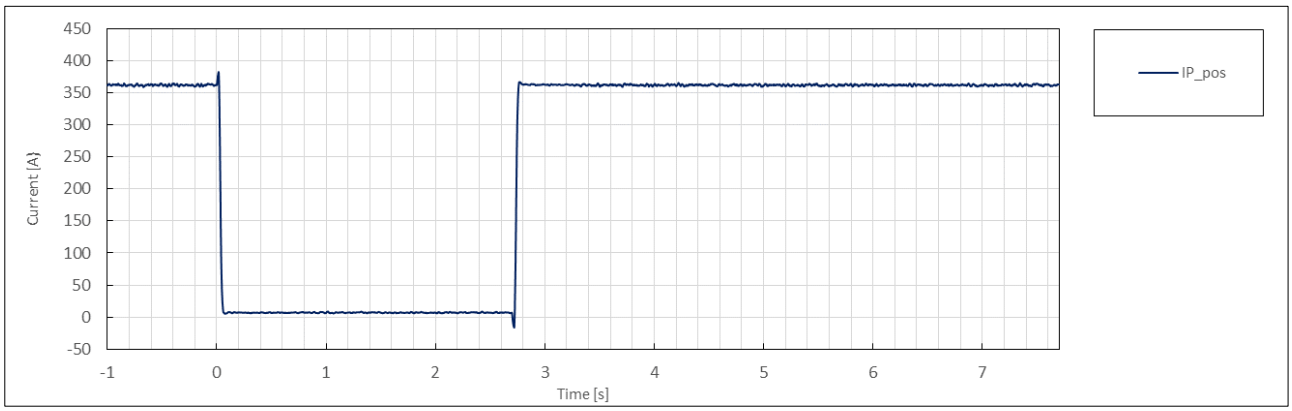


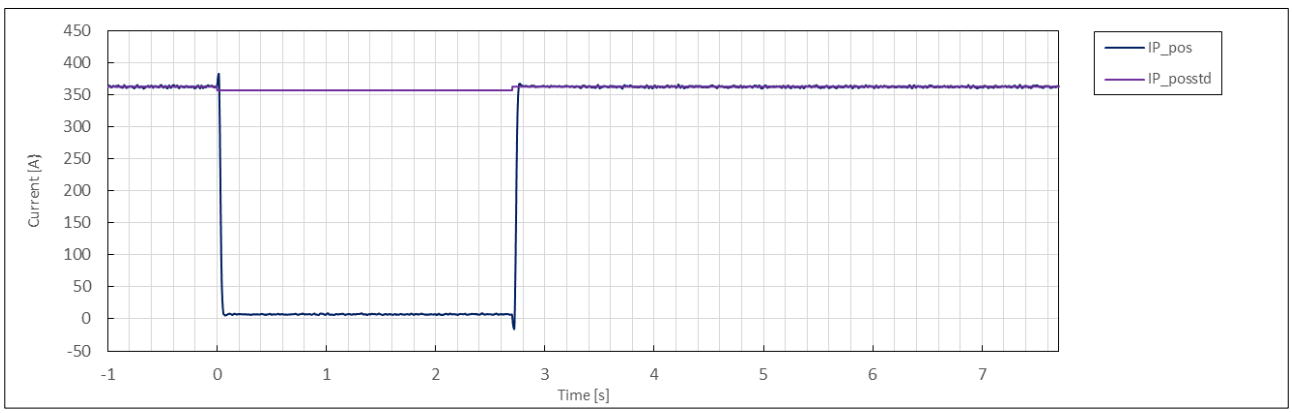


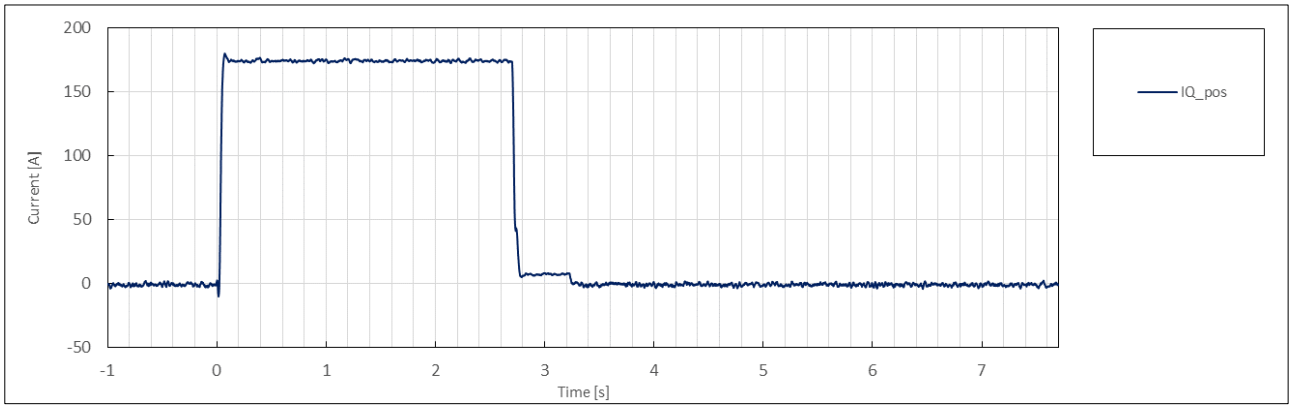


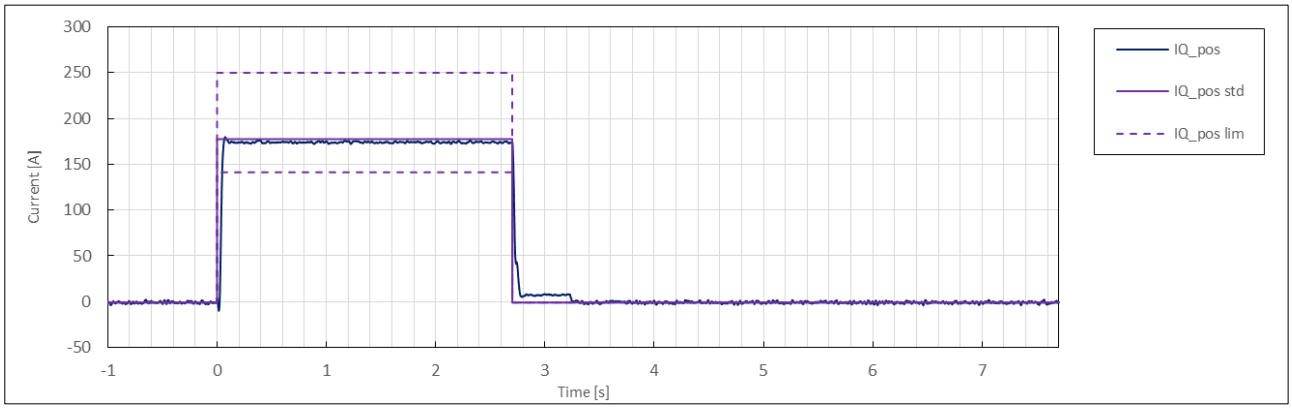

Current [A]
Time [s]
Ia
Ib
Ic

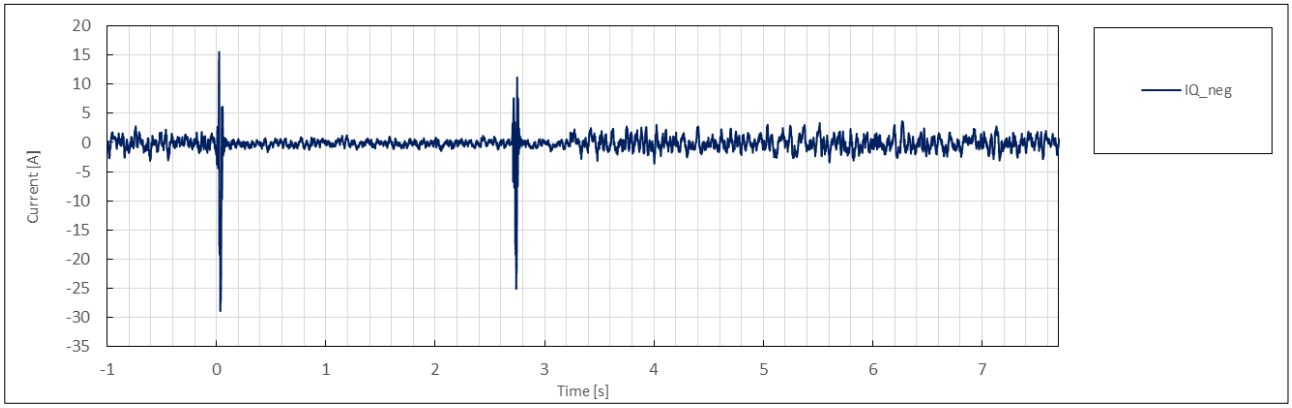

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

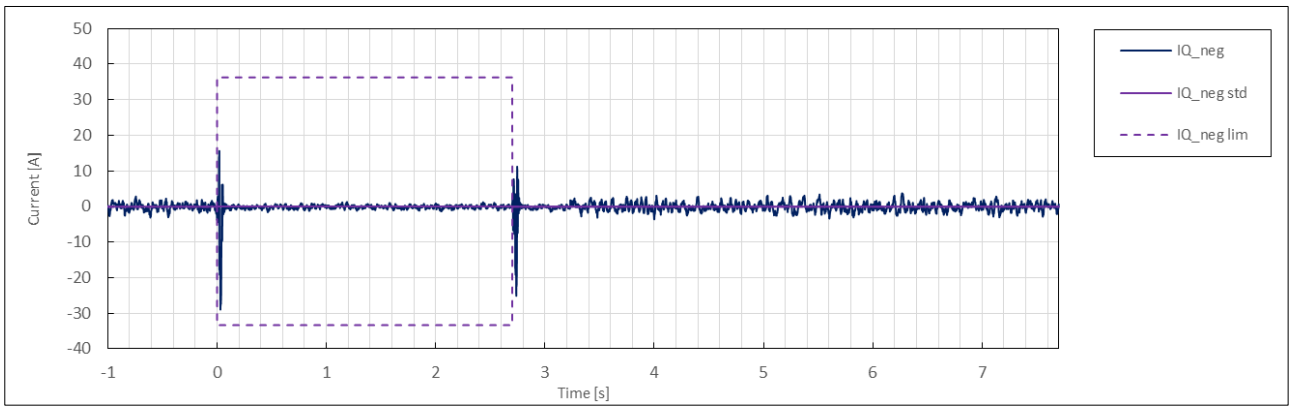

Current [A]
Time [s]
IP_pos

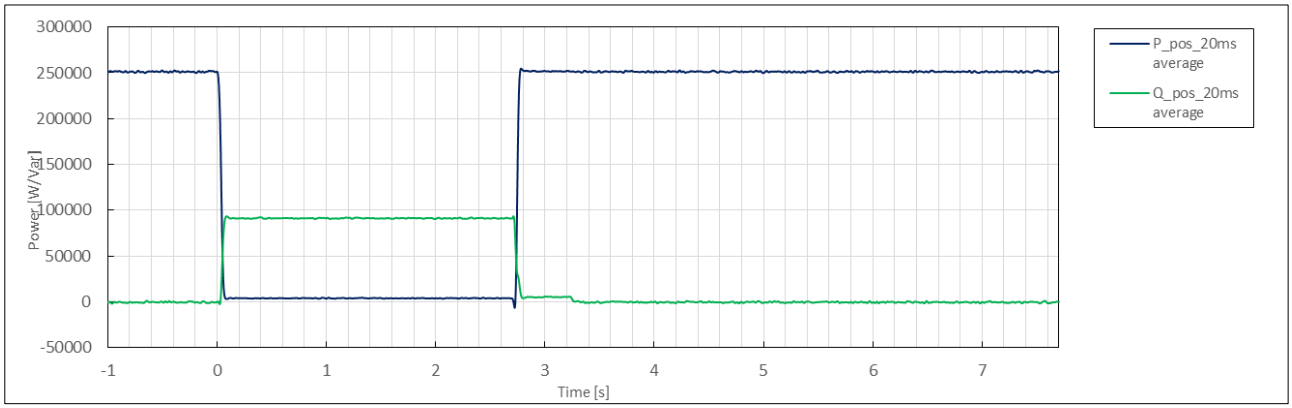

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

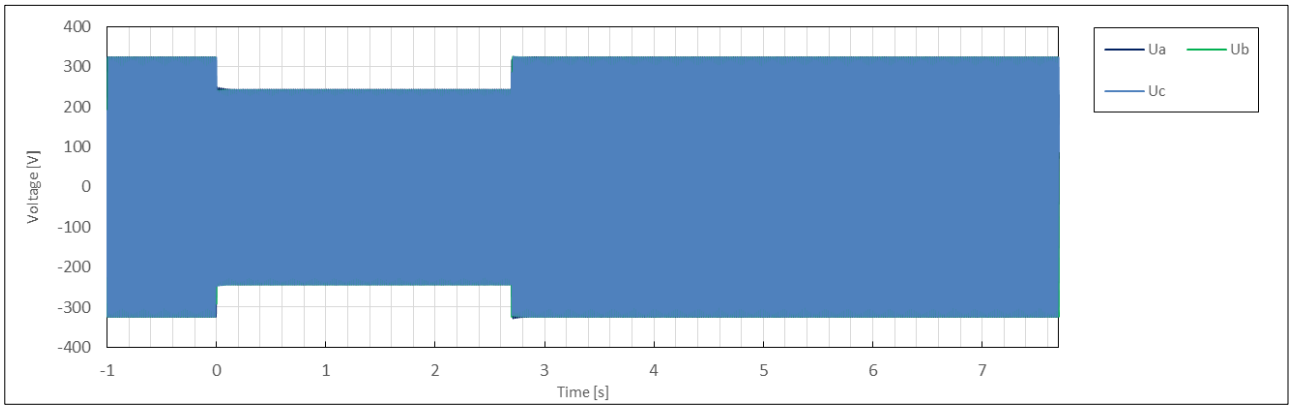

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

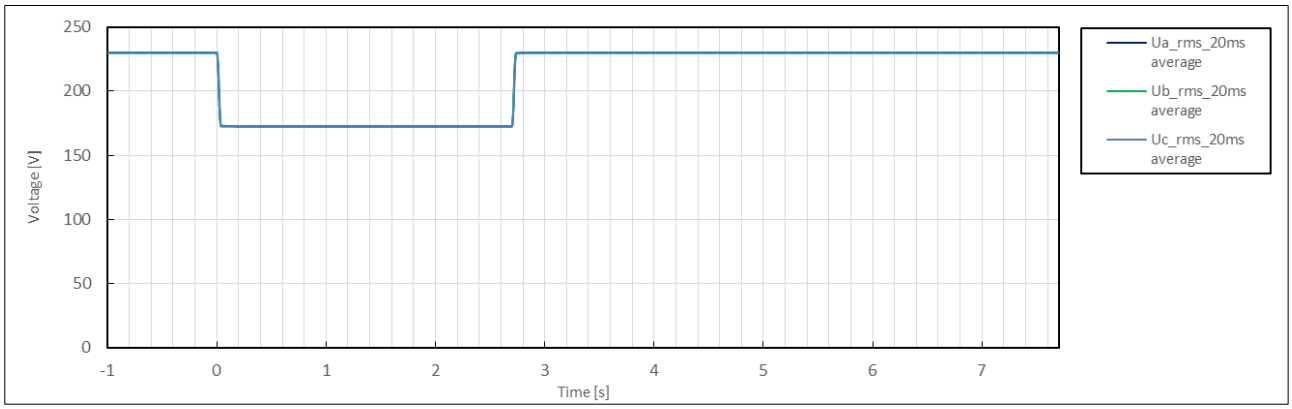

Current [A]
Time [s]
IQ_neg

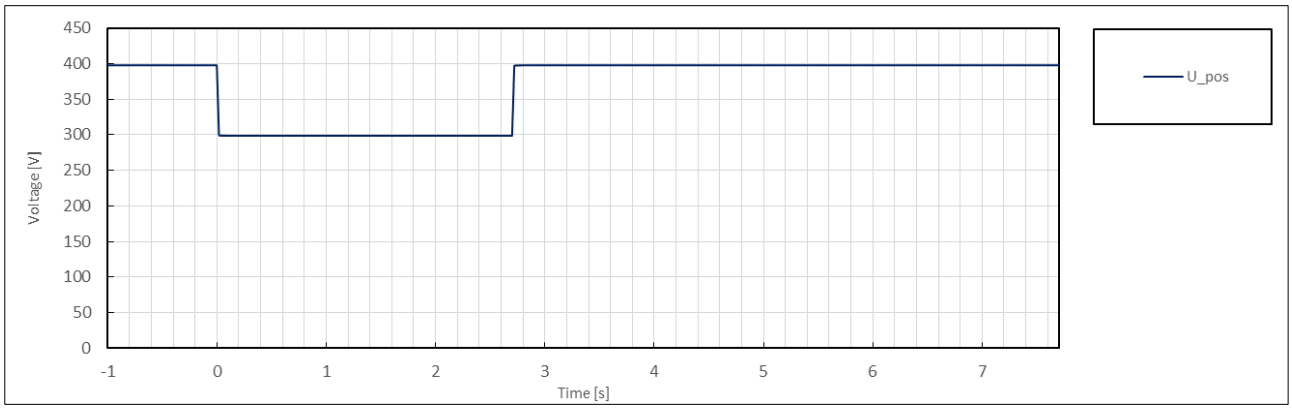

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
Time [s]
P_pos_20ms average
Q_pos_20ms average

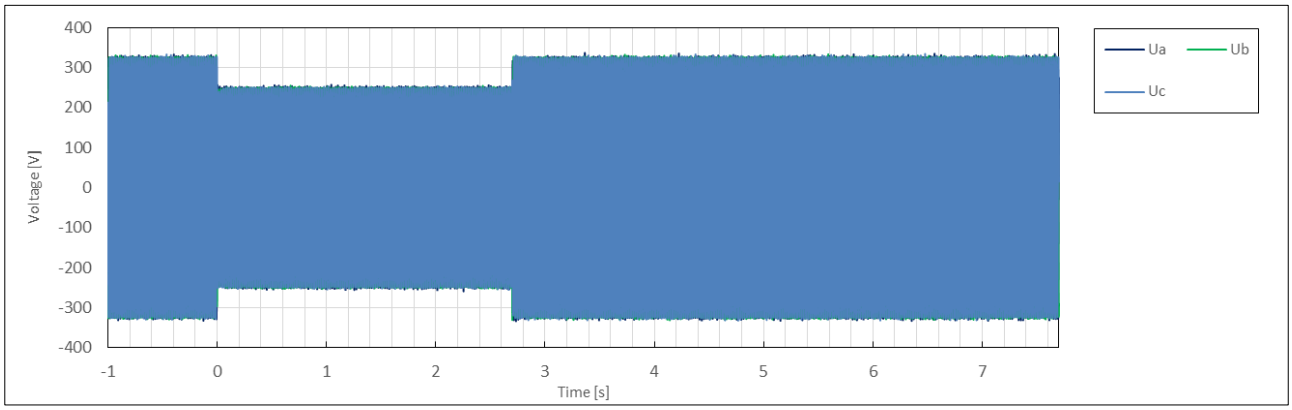
No. 4.2 Idle Test

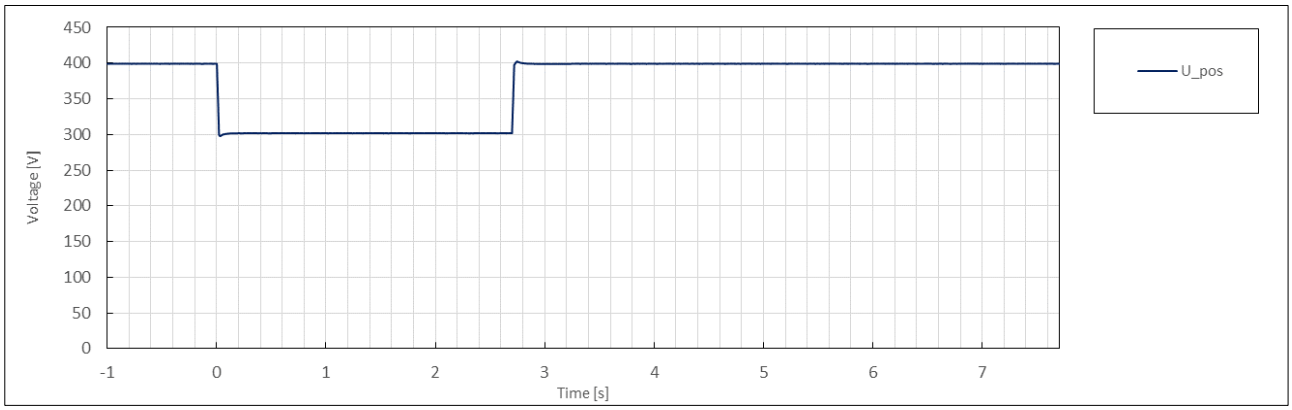


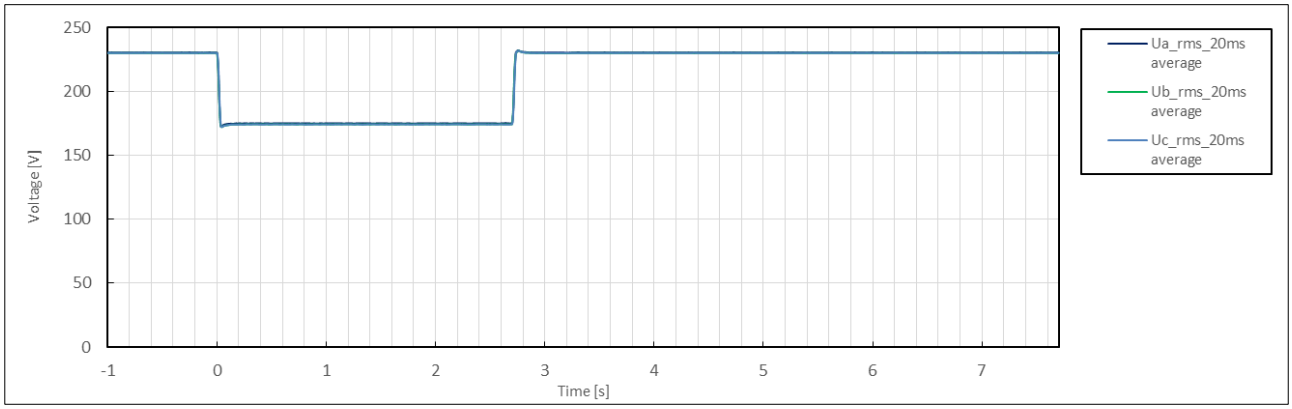


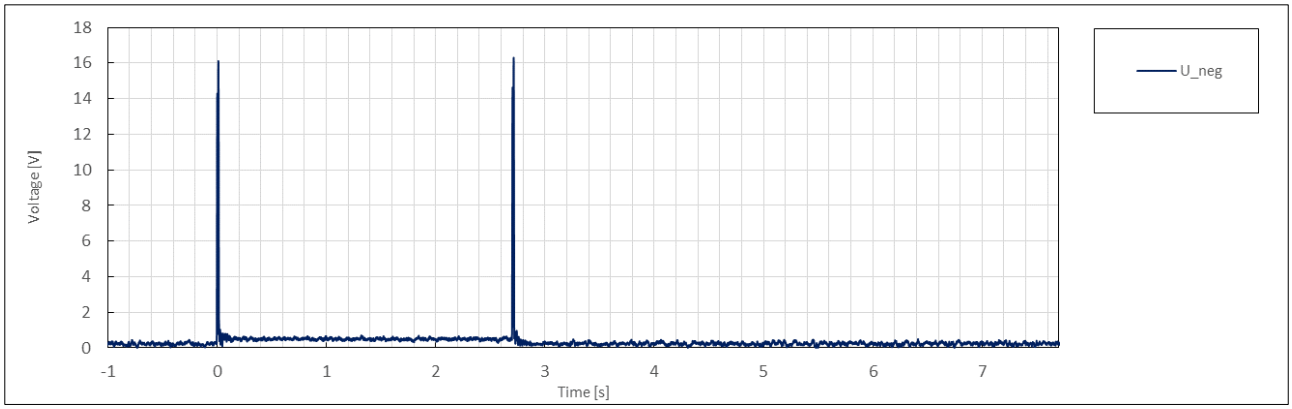


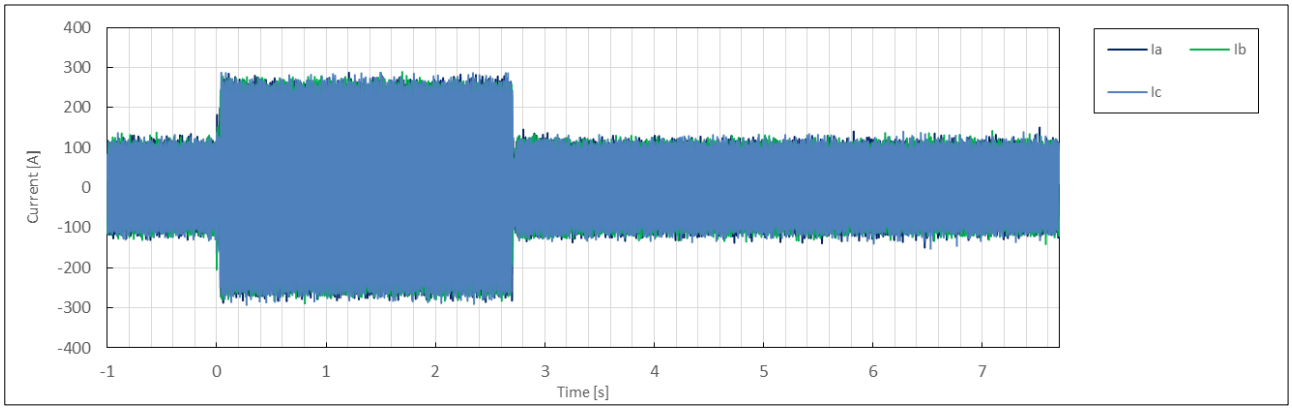
No. 4.2 Load Test

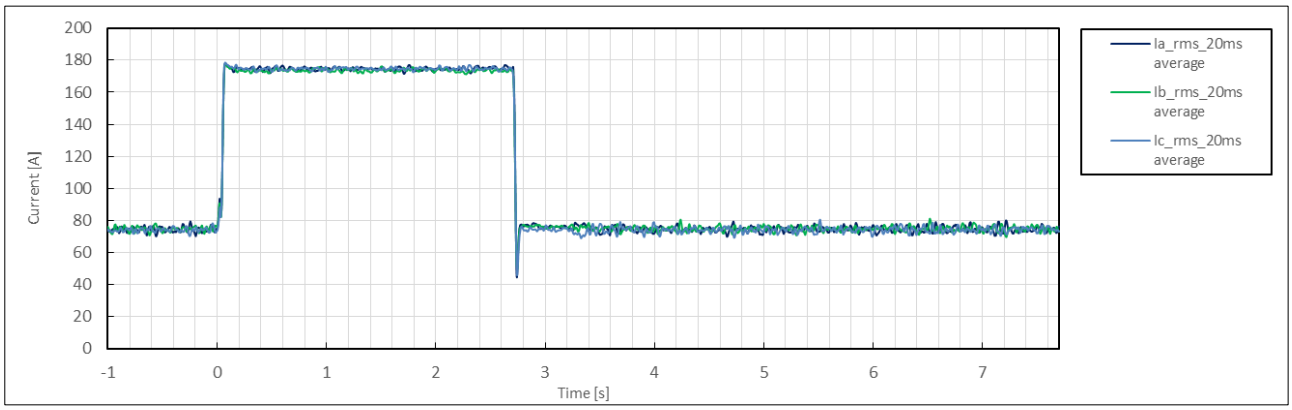


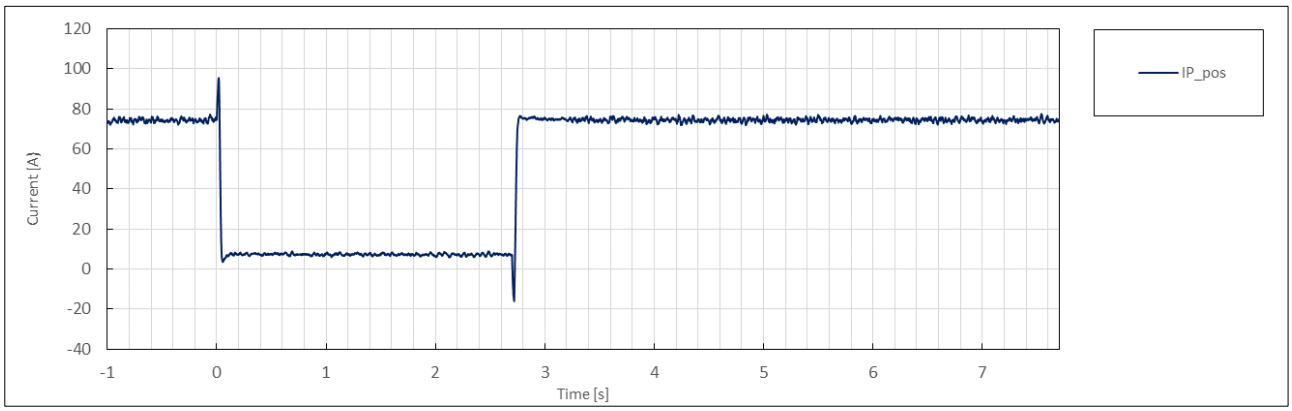


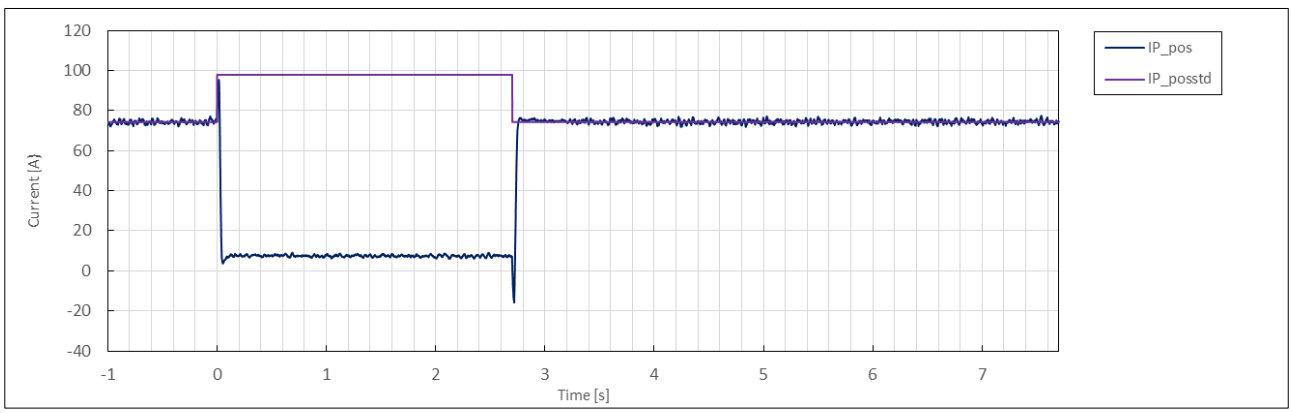


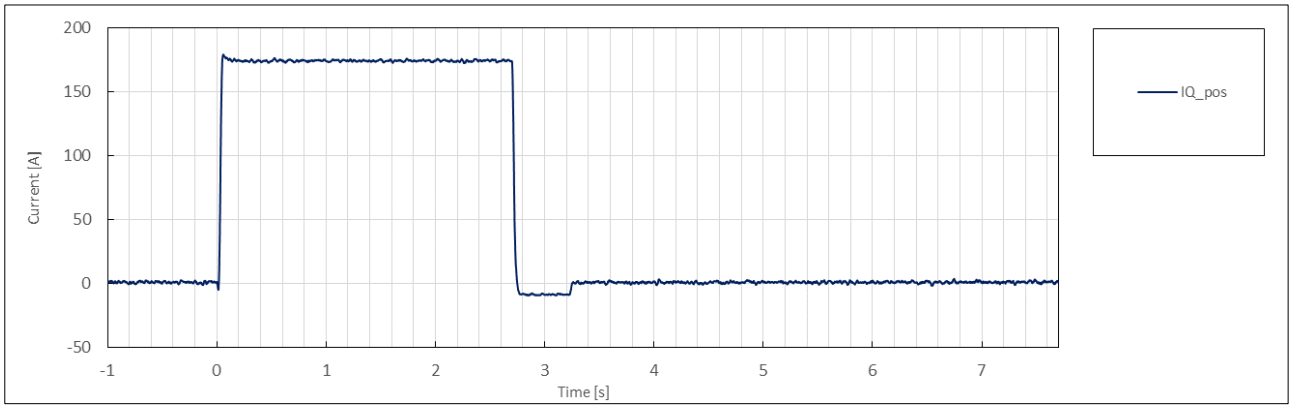


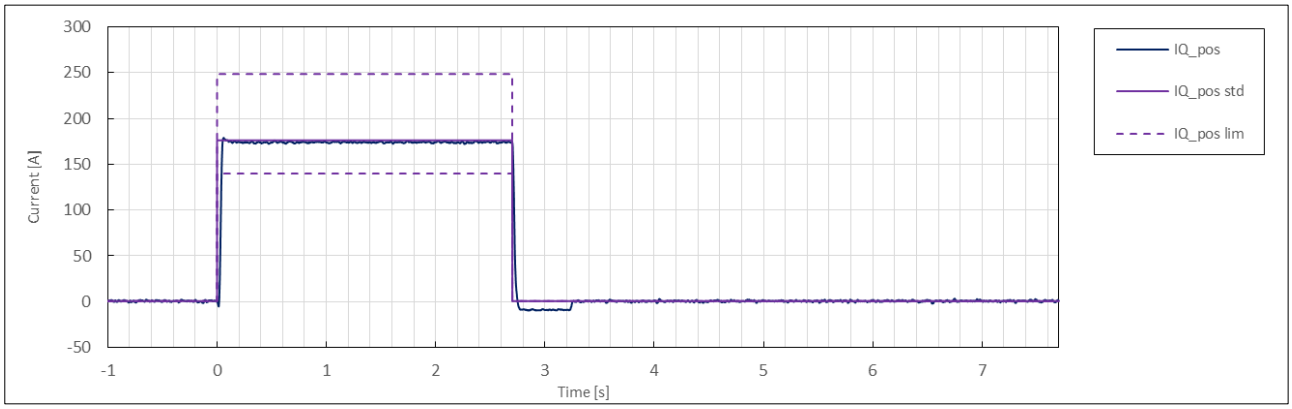

Current [A]
Time [s]
Ia
Ib
Ic

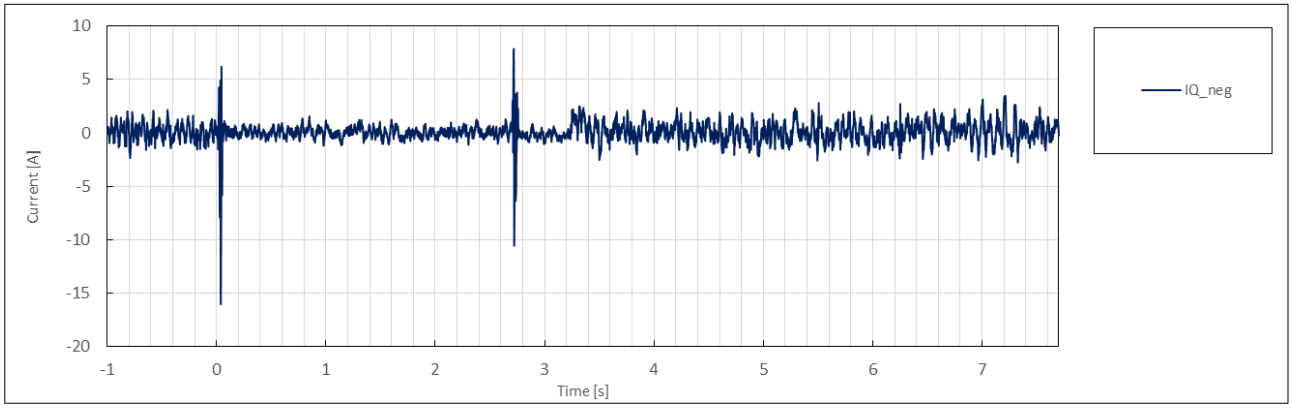

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

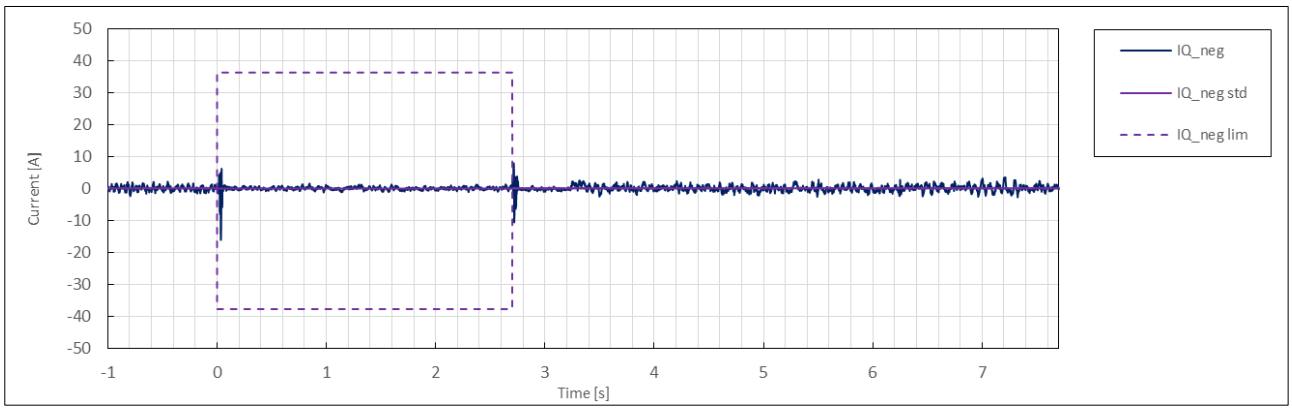

Current [A]
Time [s]
IP_pos

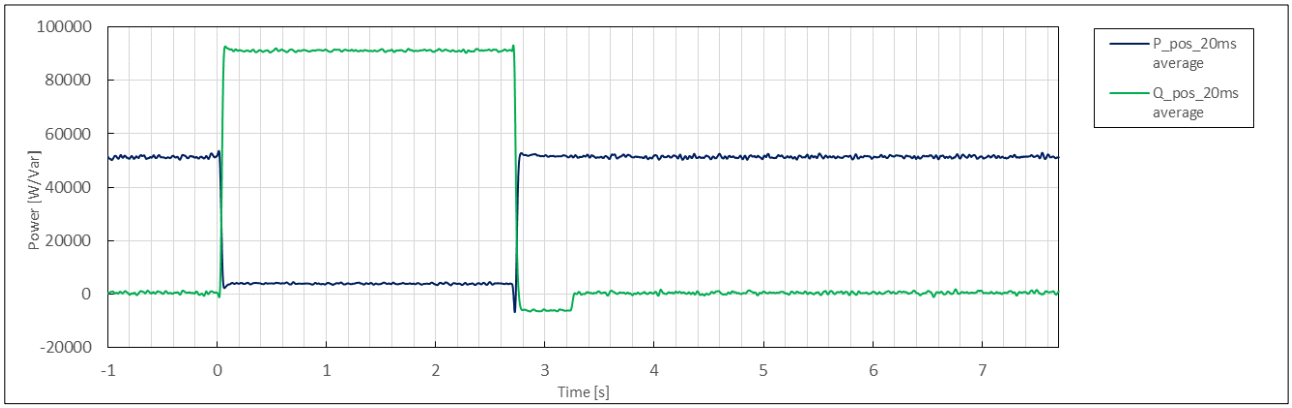

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

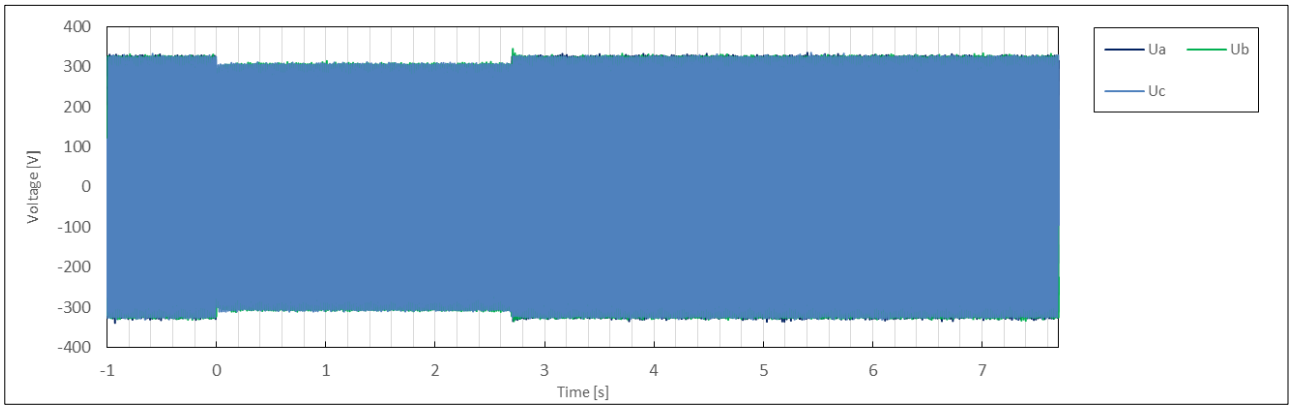

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

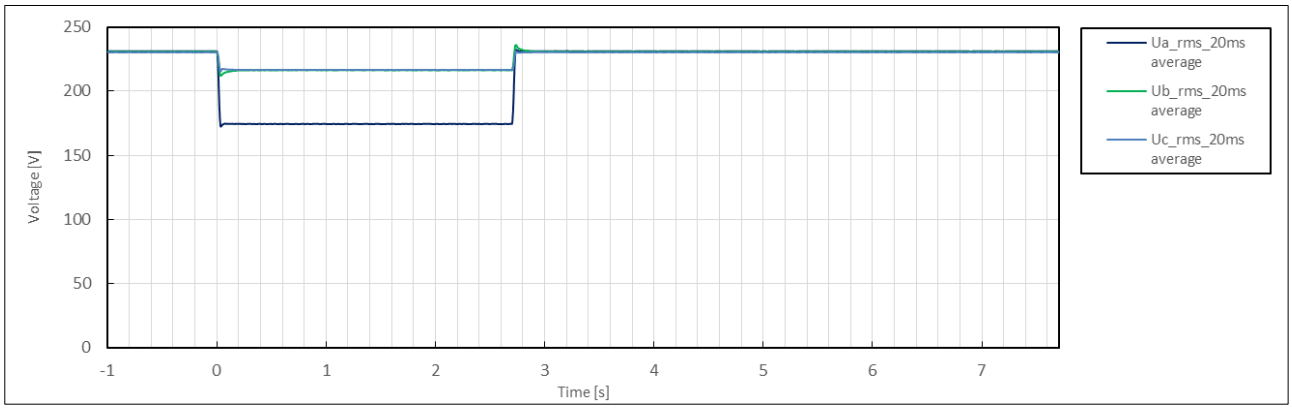

Current [A]
Time [s]
IQ_neg

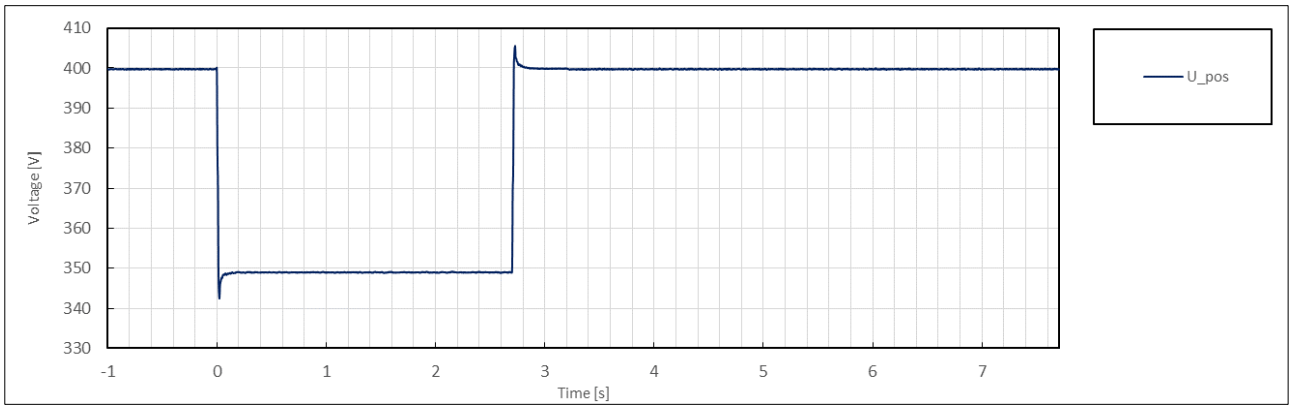

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


100000
80000
60000
40000
20000
0
-20000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
Time [s]
P_pos_20ms average
Q_pos_20ms average

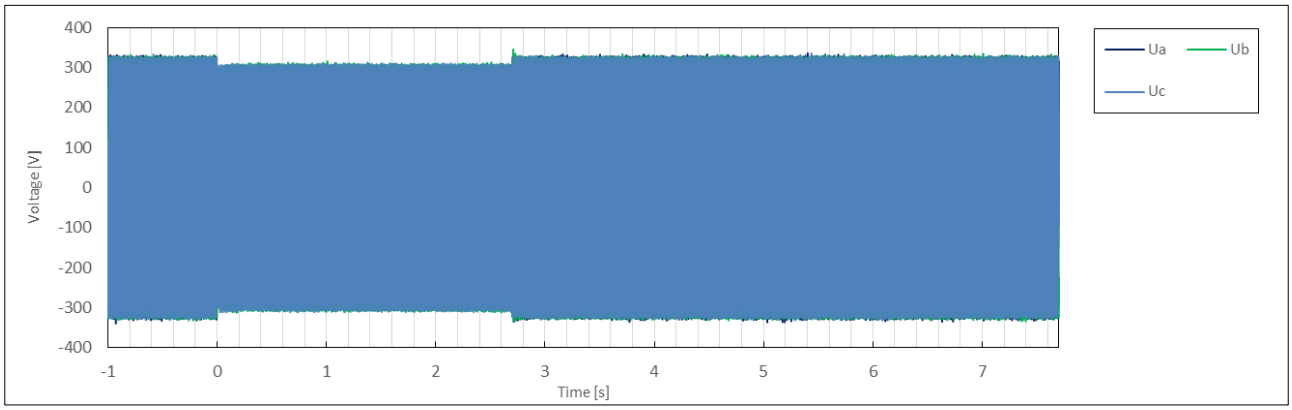
No. 4.3 Idle Test

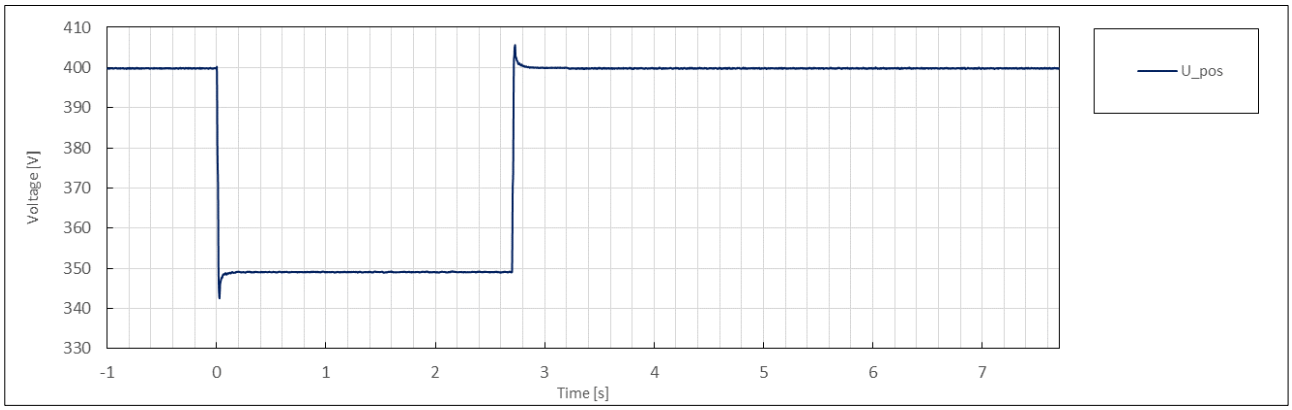


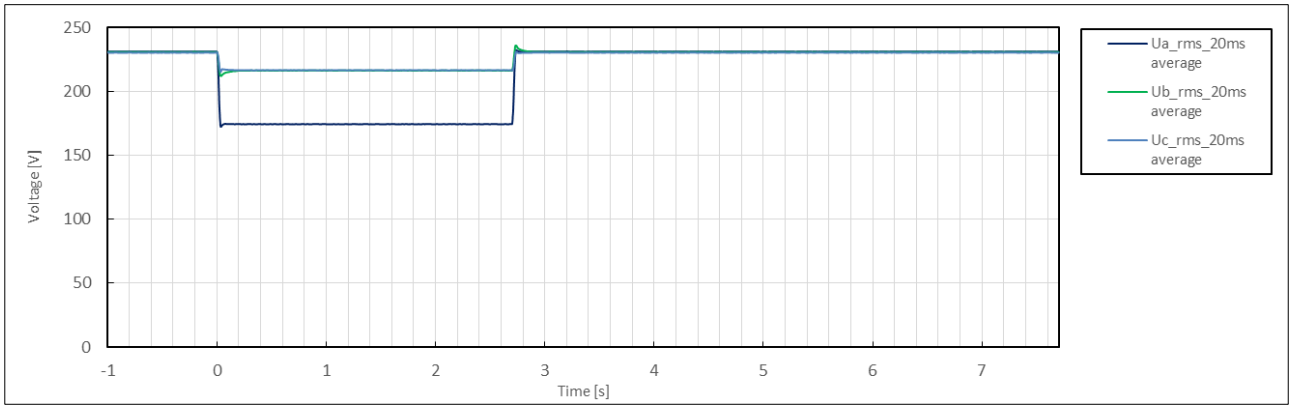


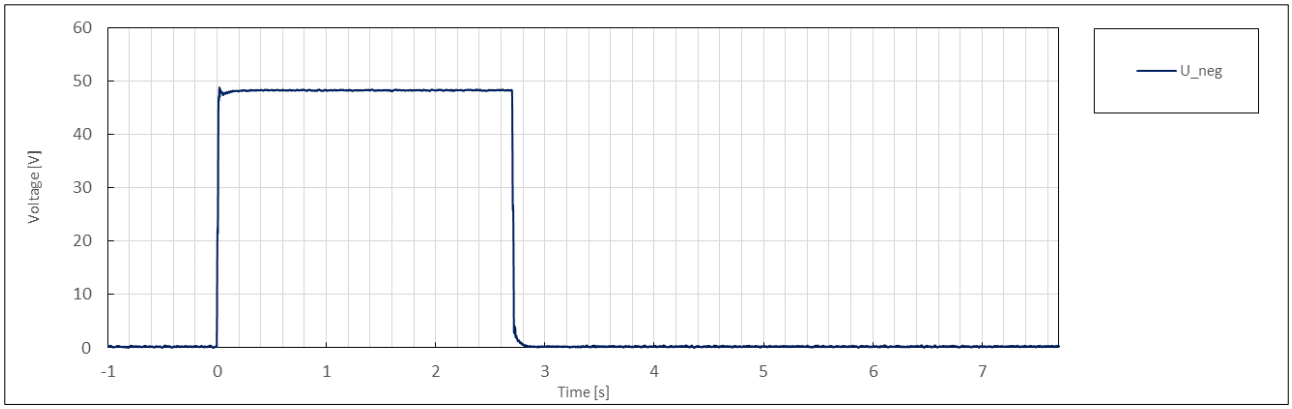


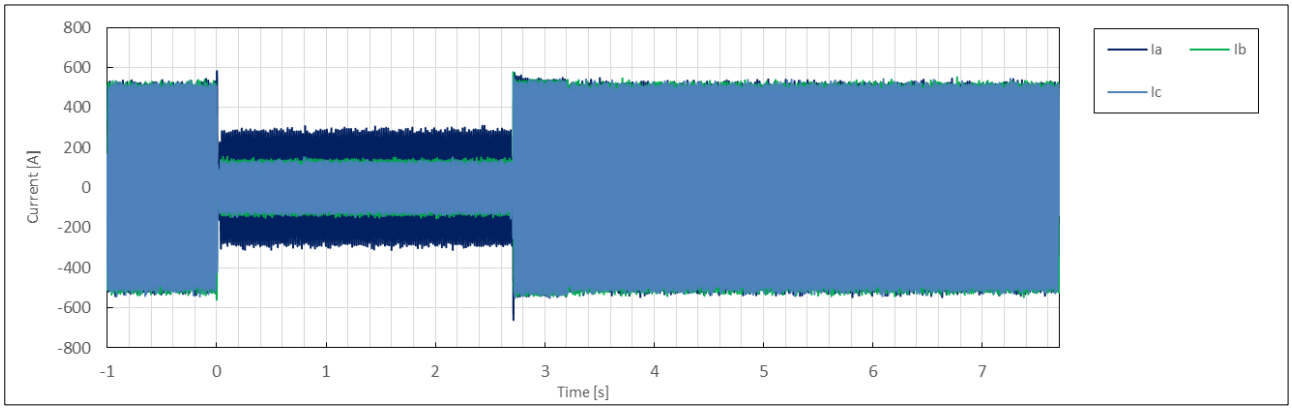
No. 4.3 Load Test

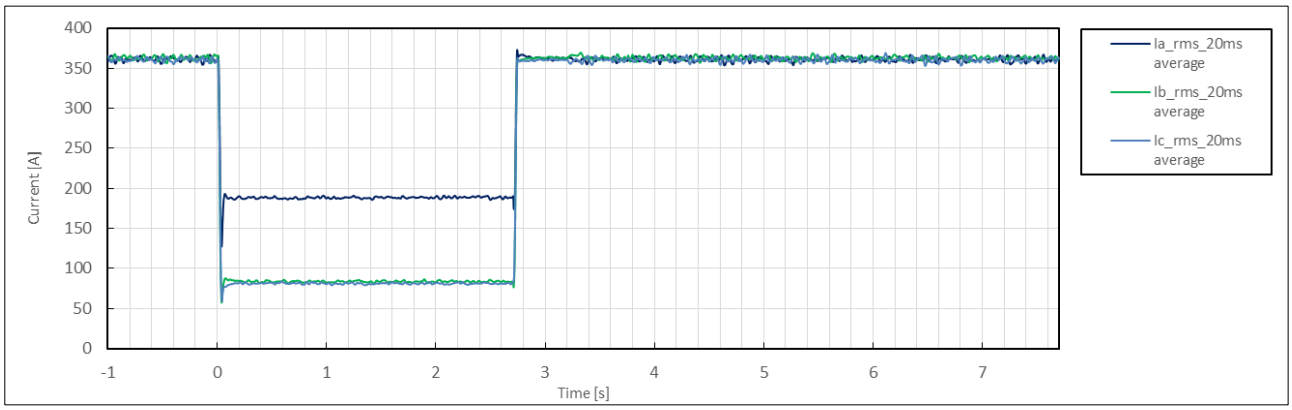


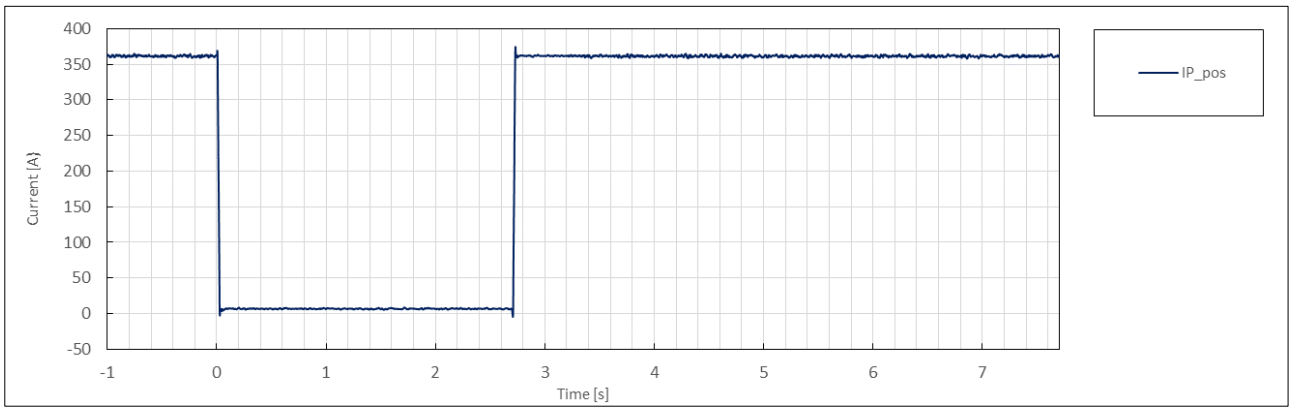


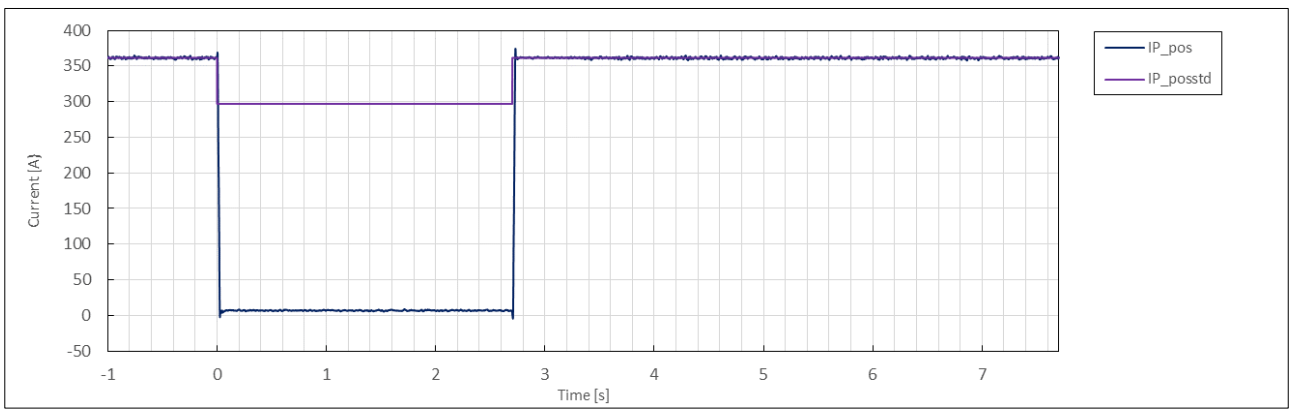


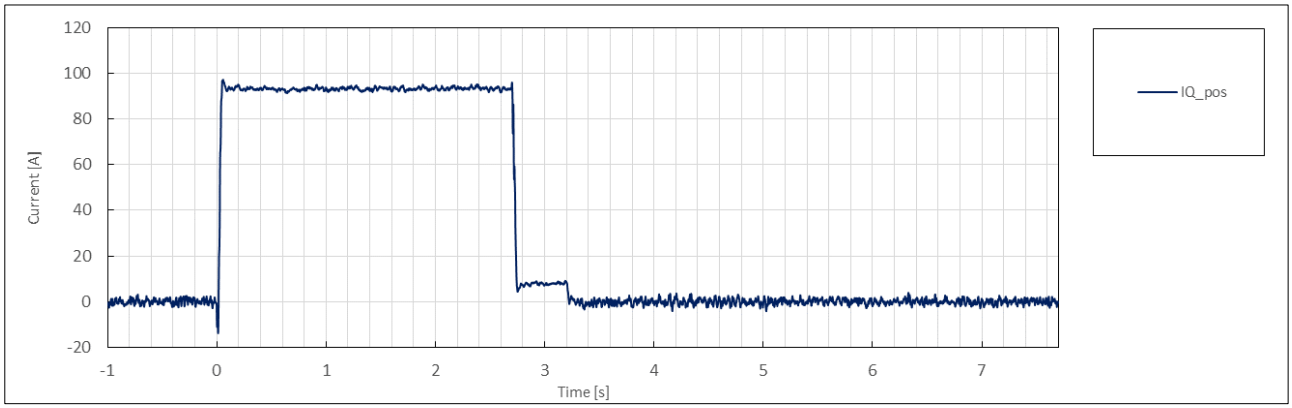


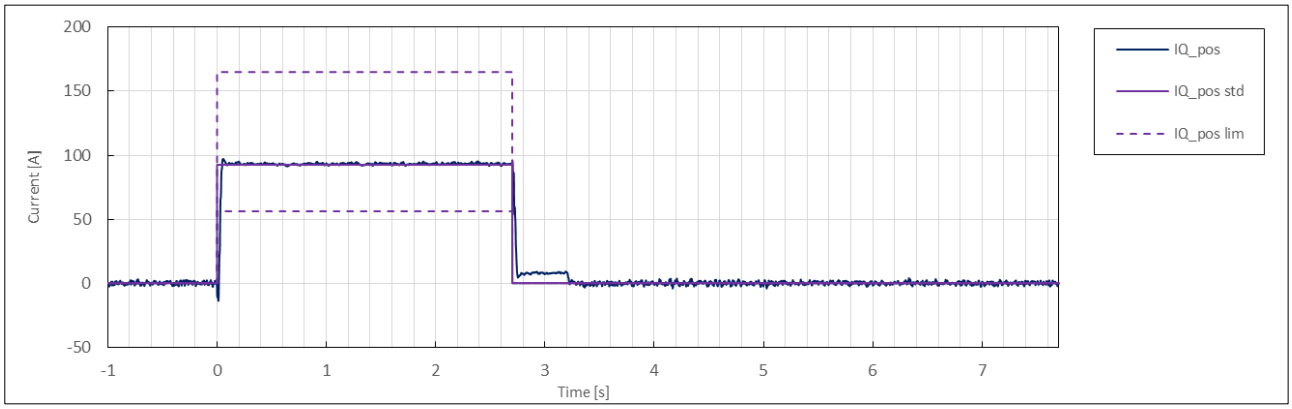

Current [A]
Time [s]
Ia
Ib
Ic

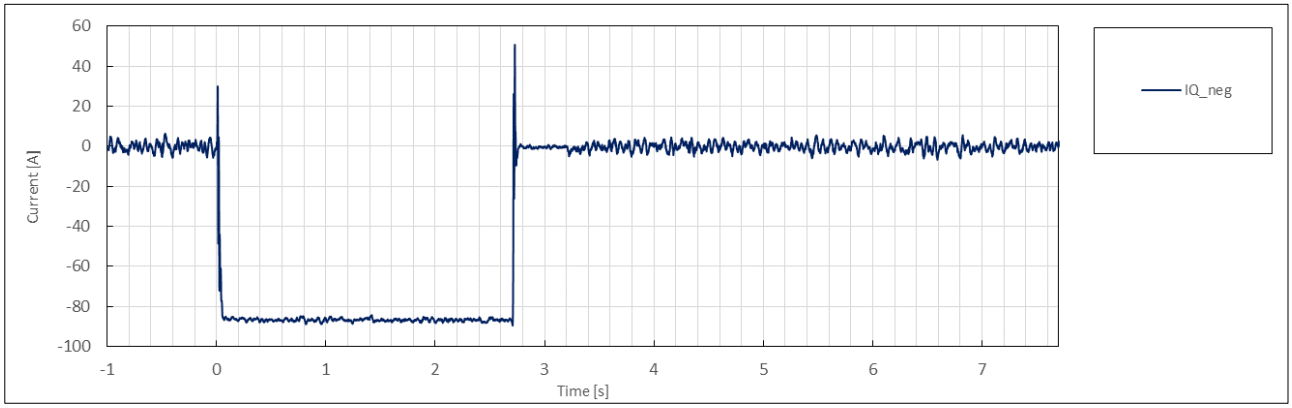

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

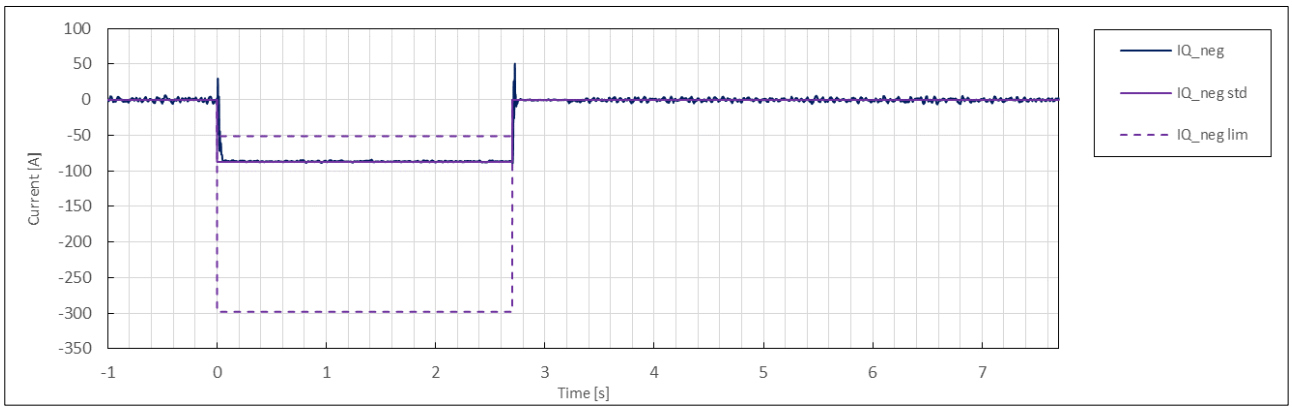

Current [A]
Time [s]
IP_pos

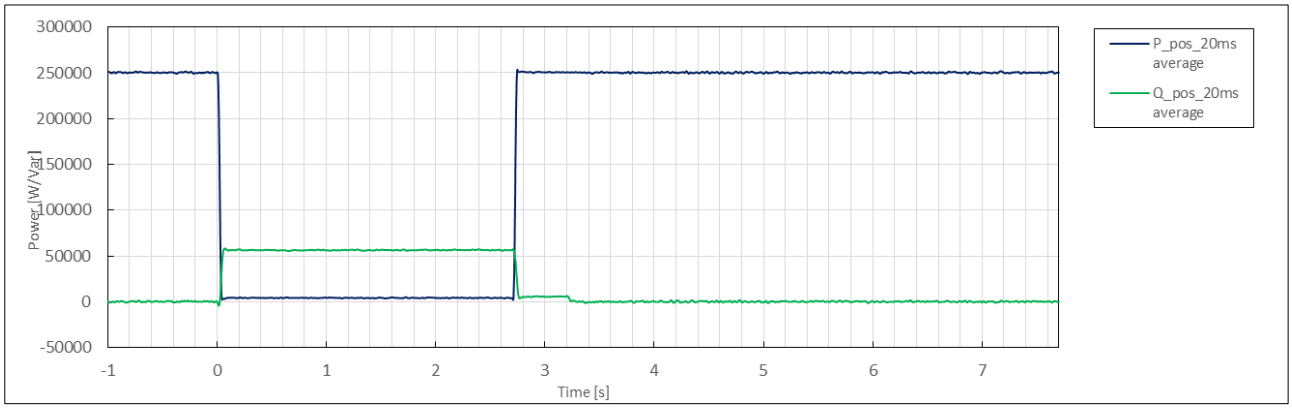

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

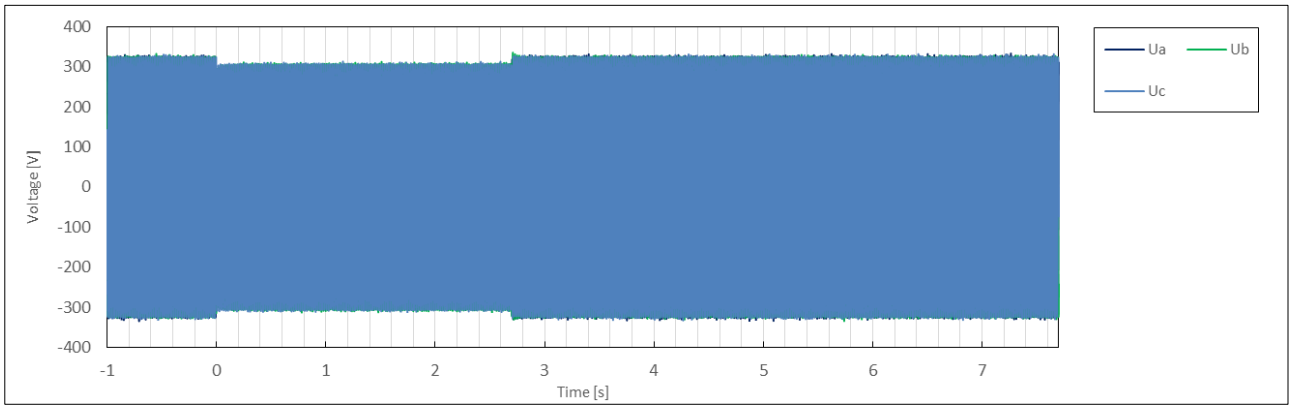

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

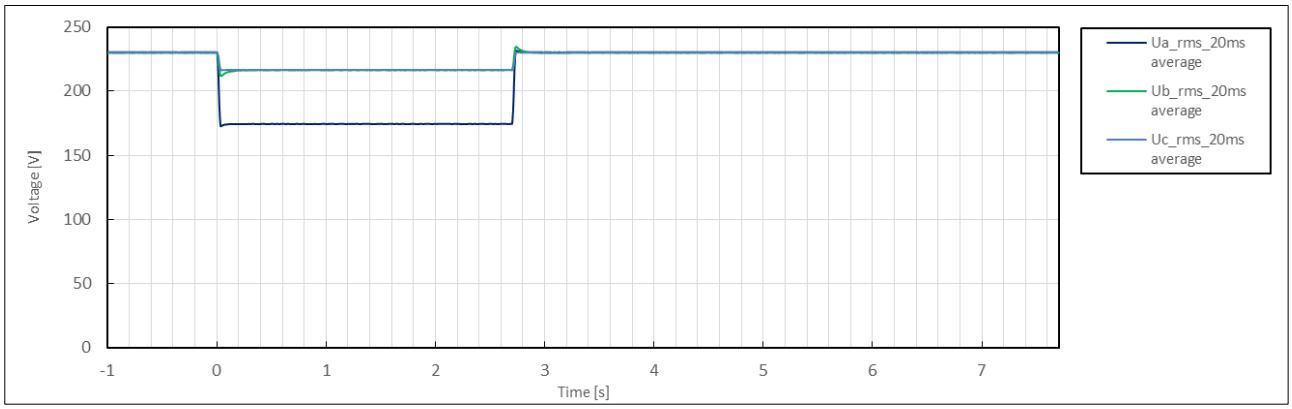

Current [A]
Time [s]
IQ_neg

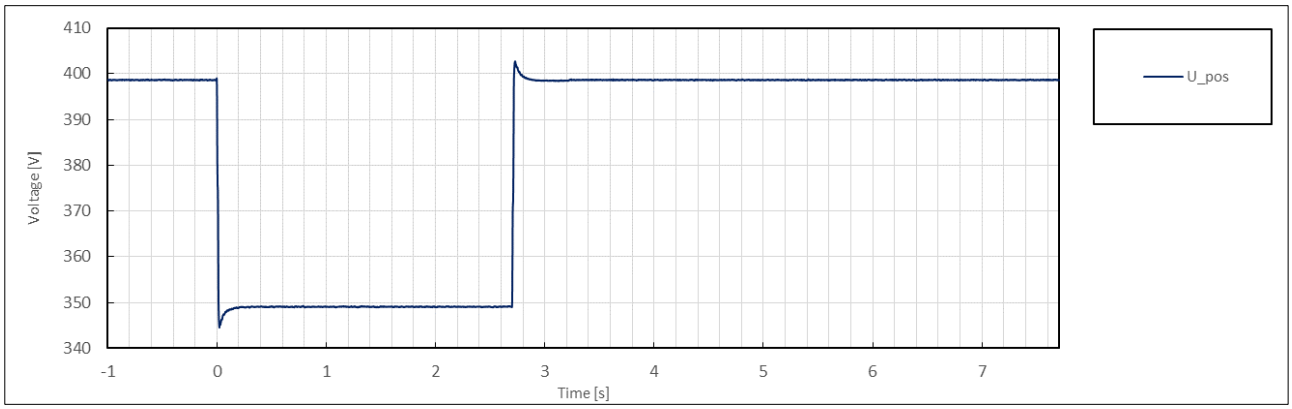

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
Time [s]
P_pos_20ms average
Q_pos_20ms average

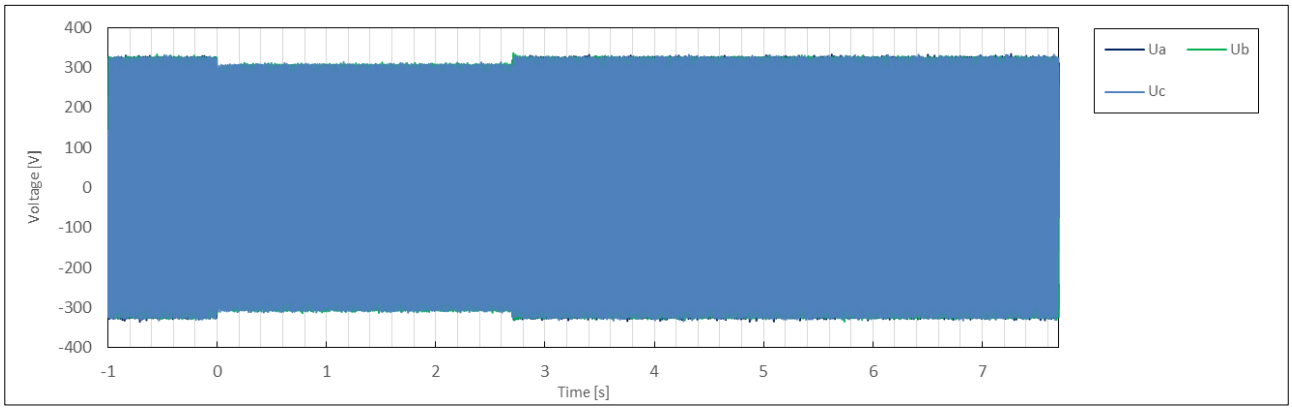
No. 4.4 Idle Test

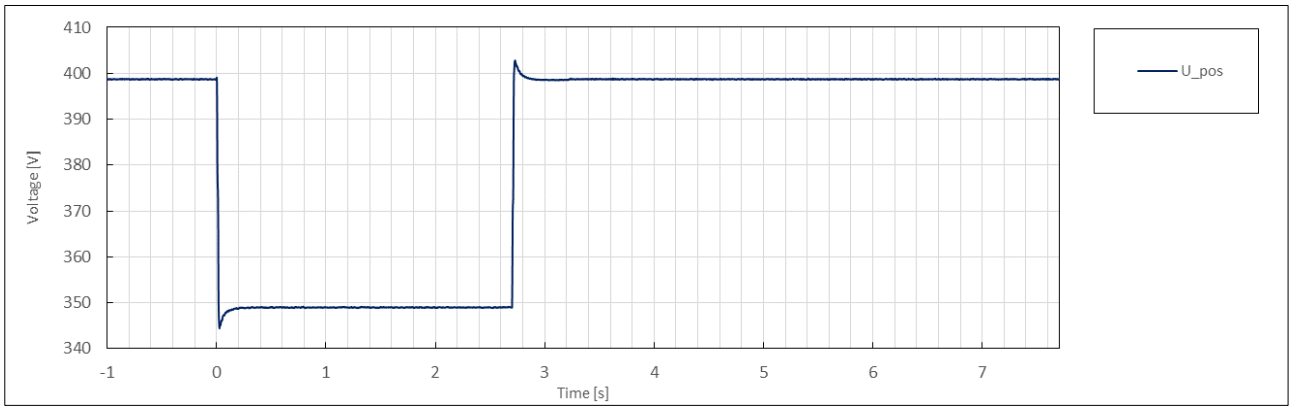


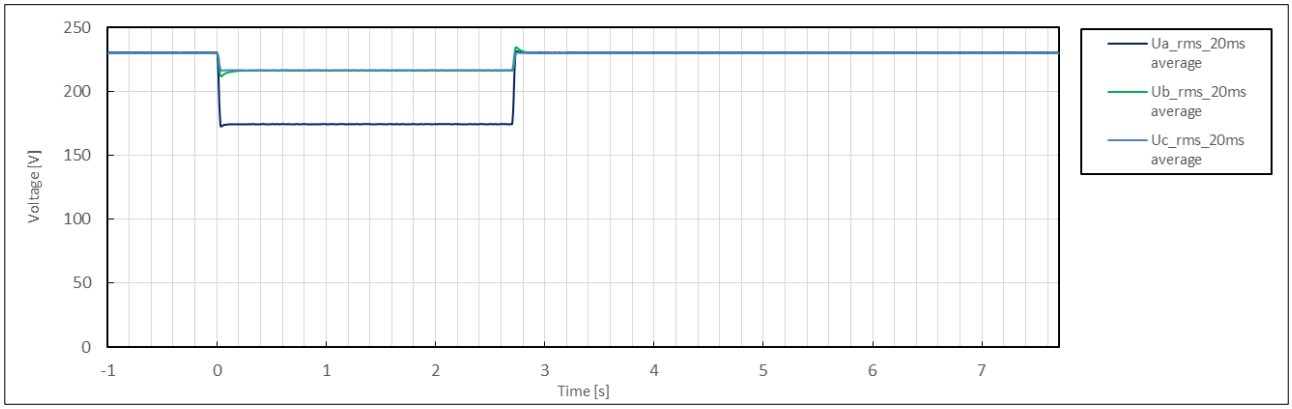


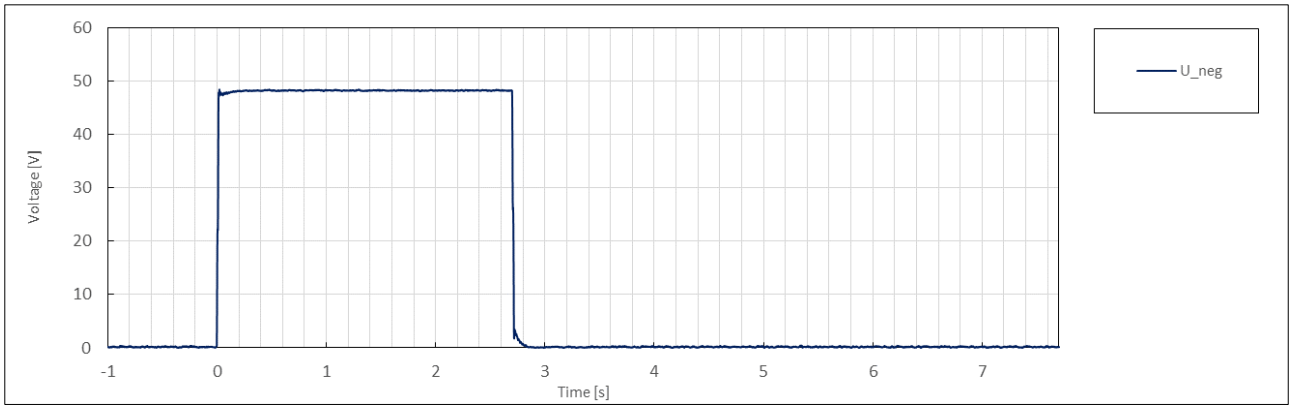


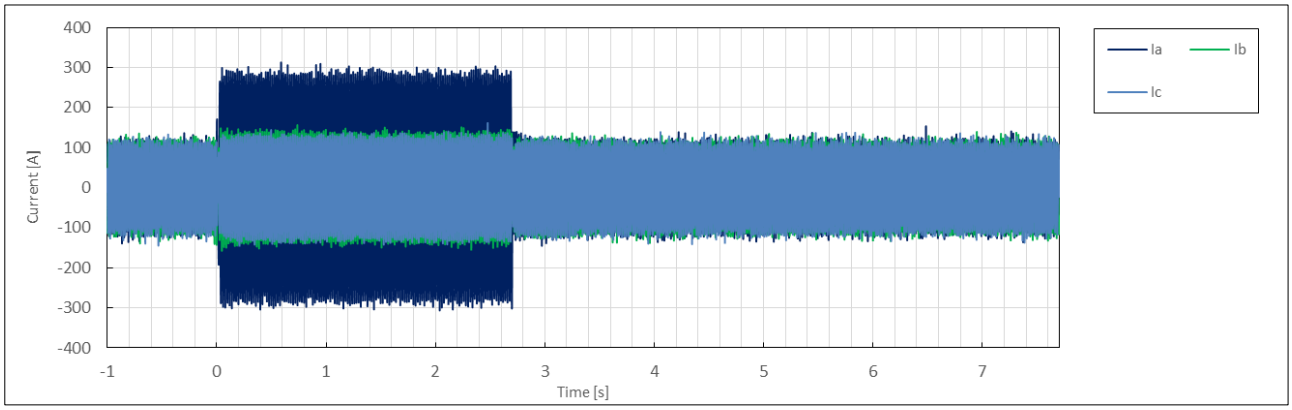
No. 4.4 Load Test

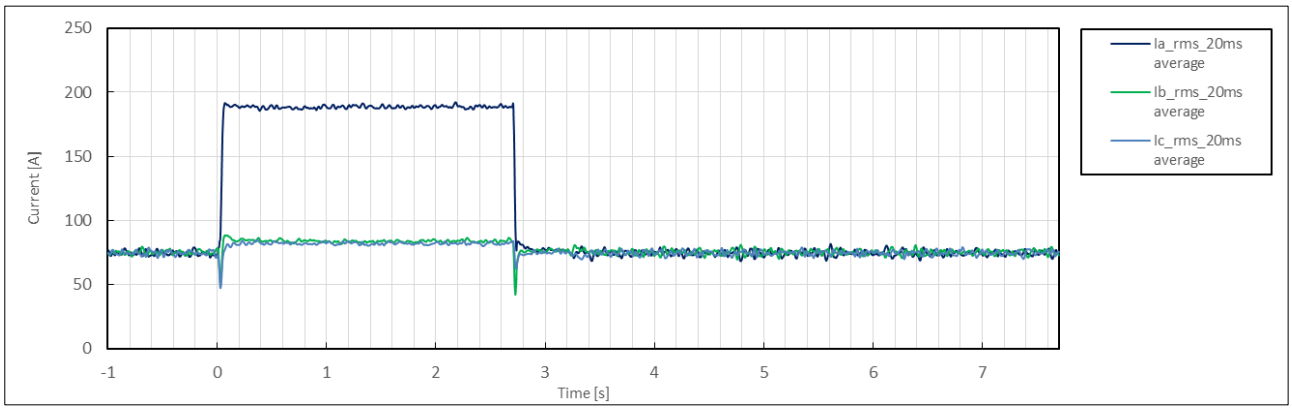


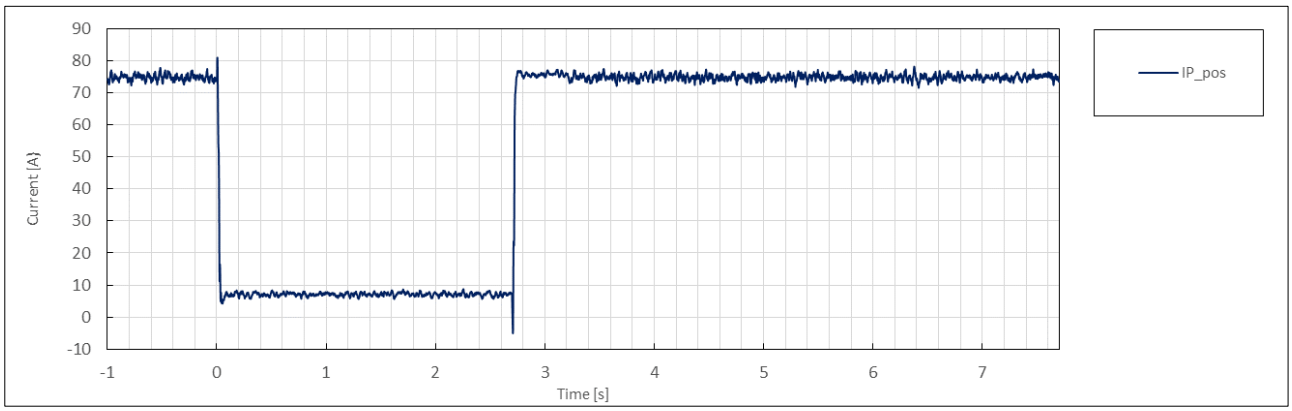


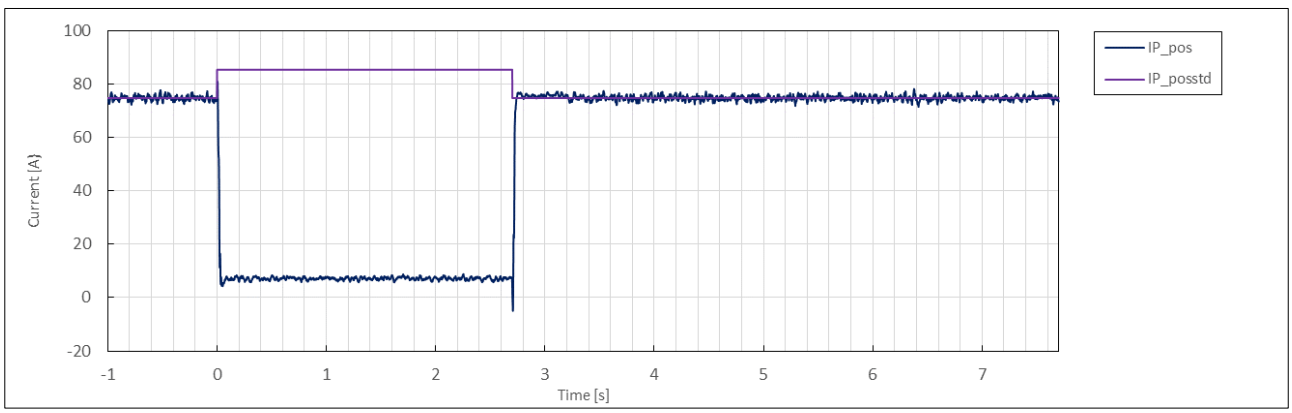


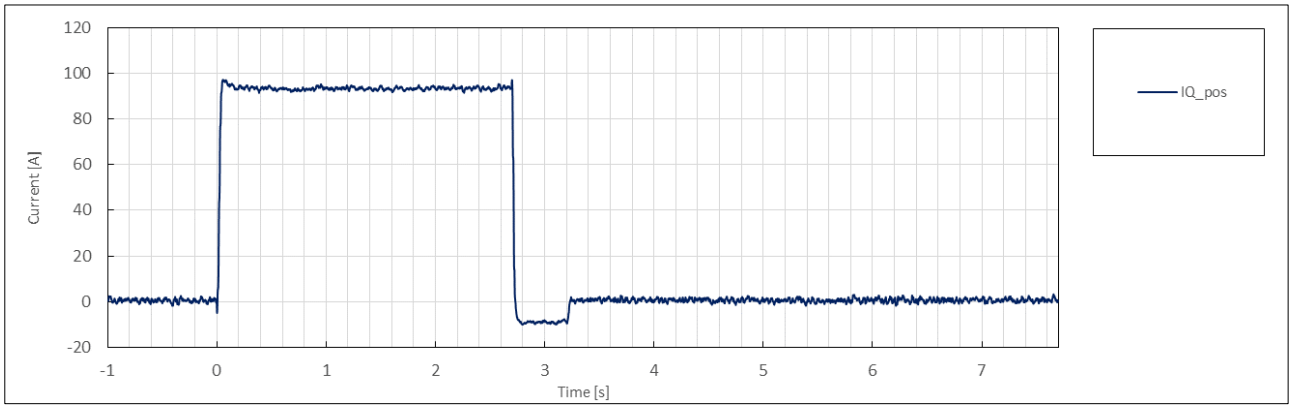


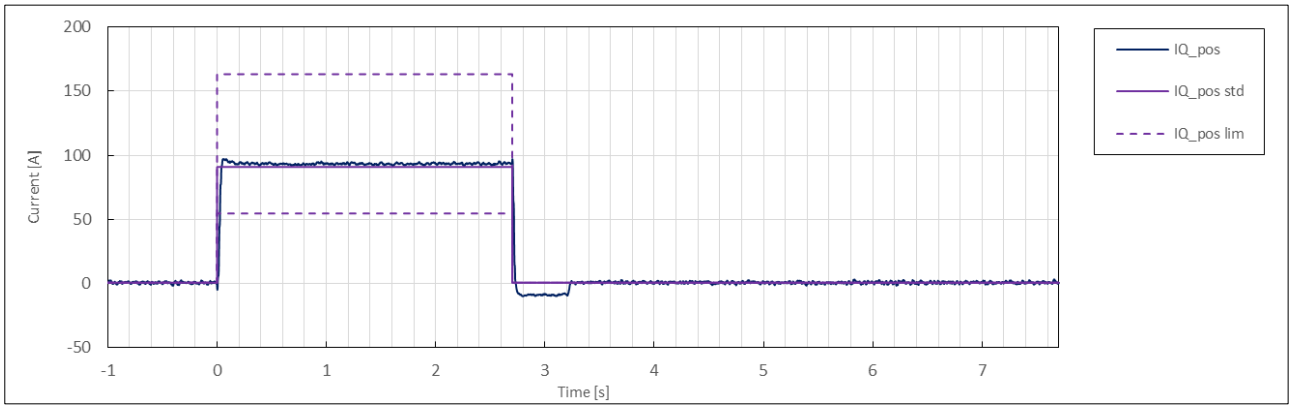

Current [A]
Time [s]
Ia
Ib
Ic

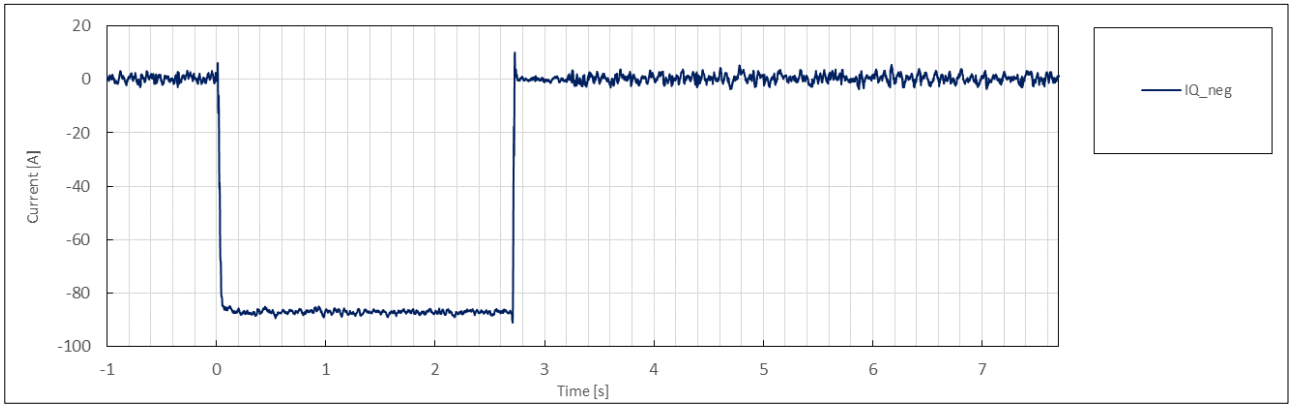

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

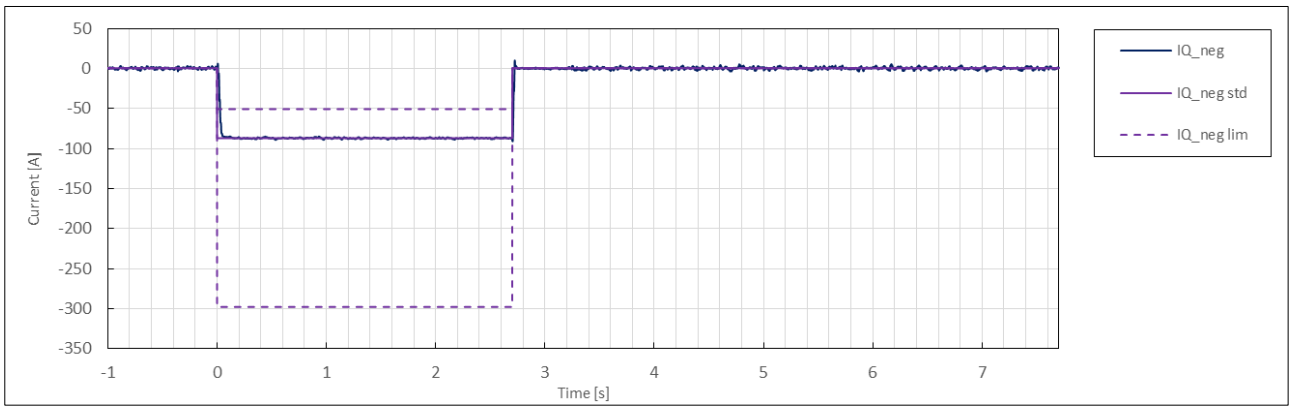

Current [A]
Time [s]
IP_pos

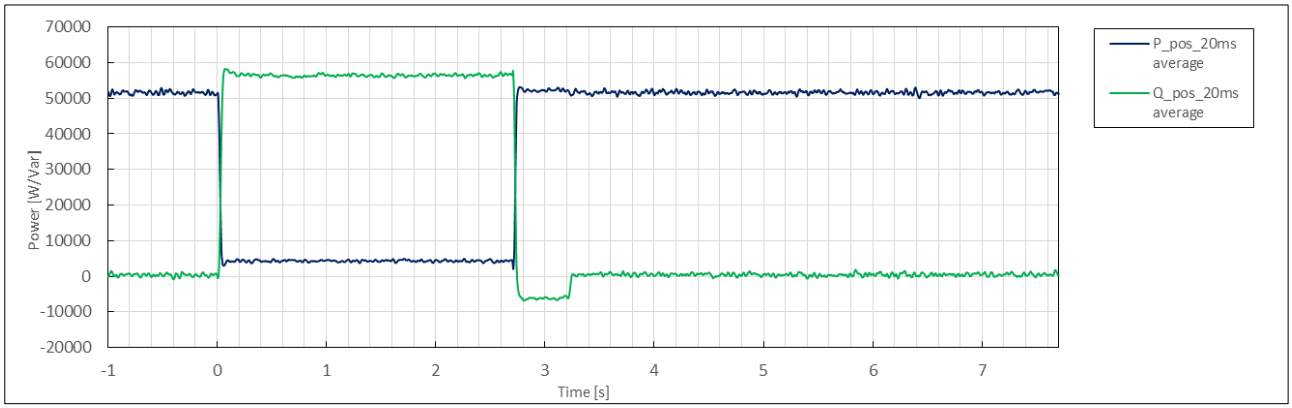

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

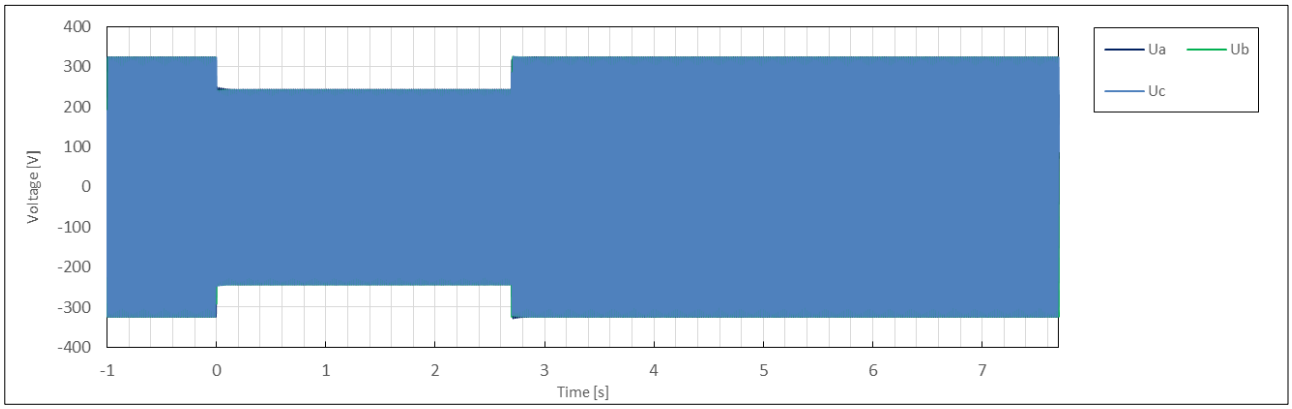

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

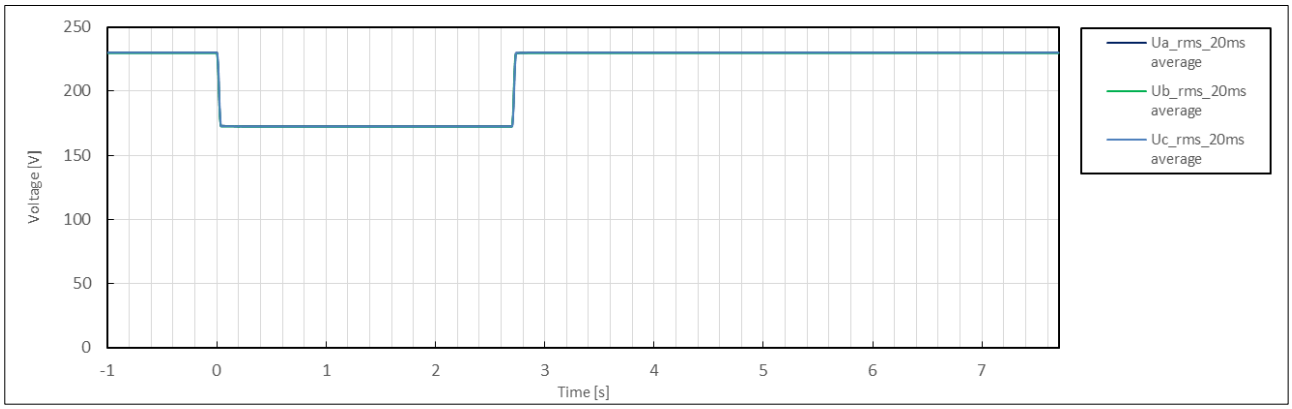

Current [A]
Time [s]
IQ_neg

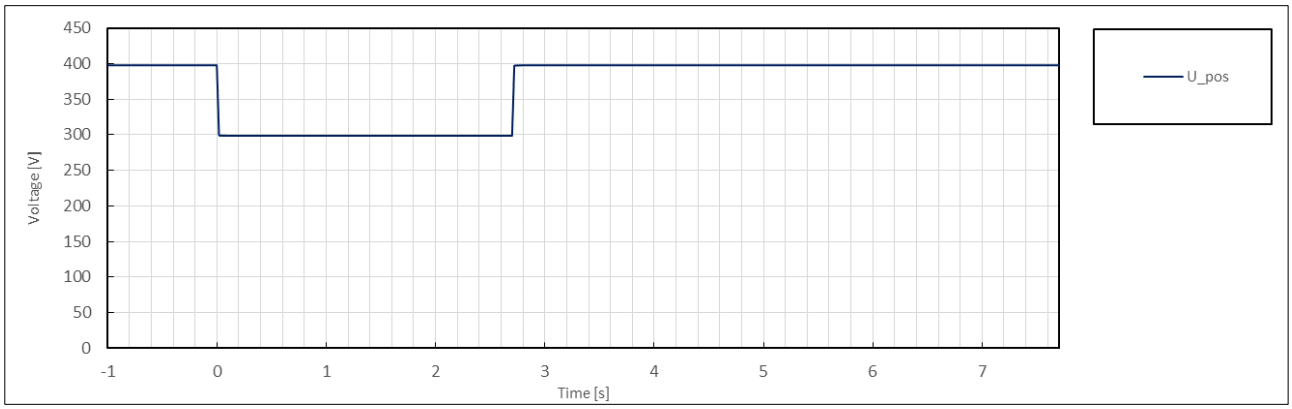

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


70000
60000
50000
40000
30000
20000
10000
0
-10000
-20000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
Time [s]
P_pos_20ms average
Q_pos_20ms average

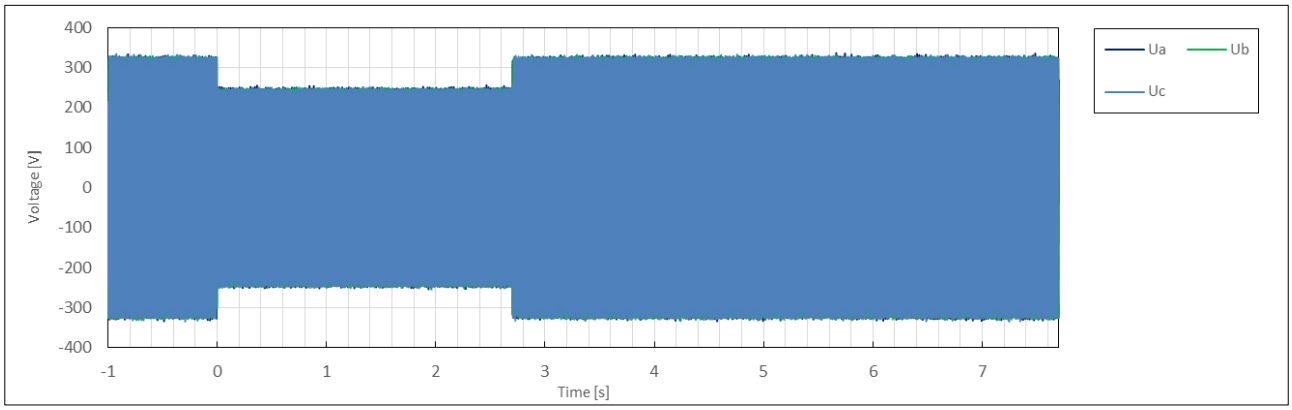
No. 4.5 Idle Test

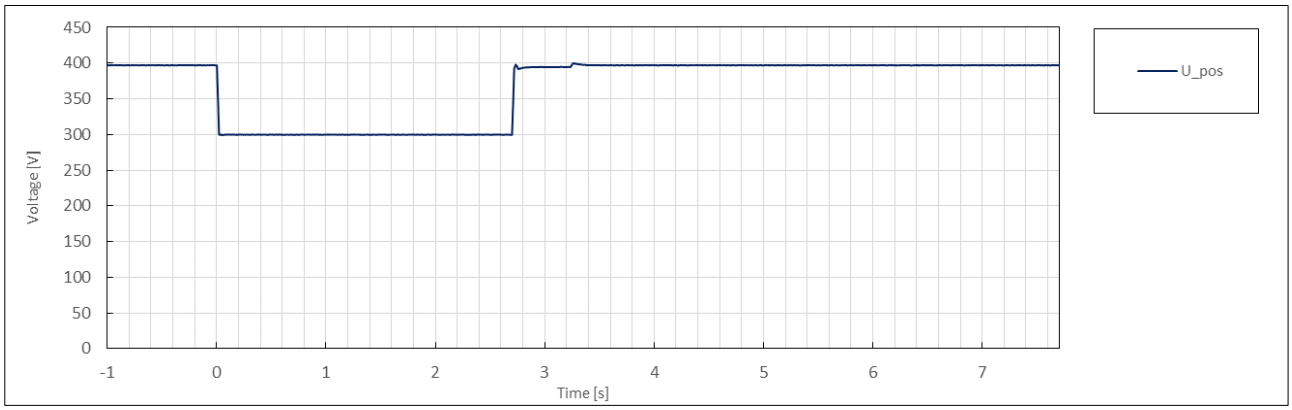


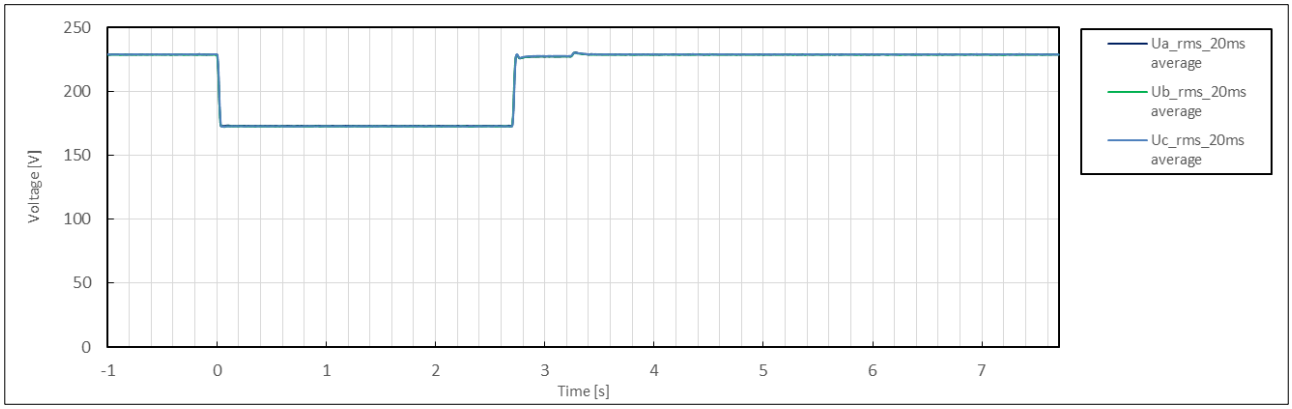


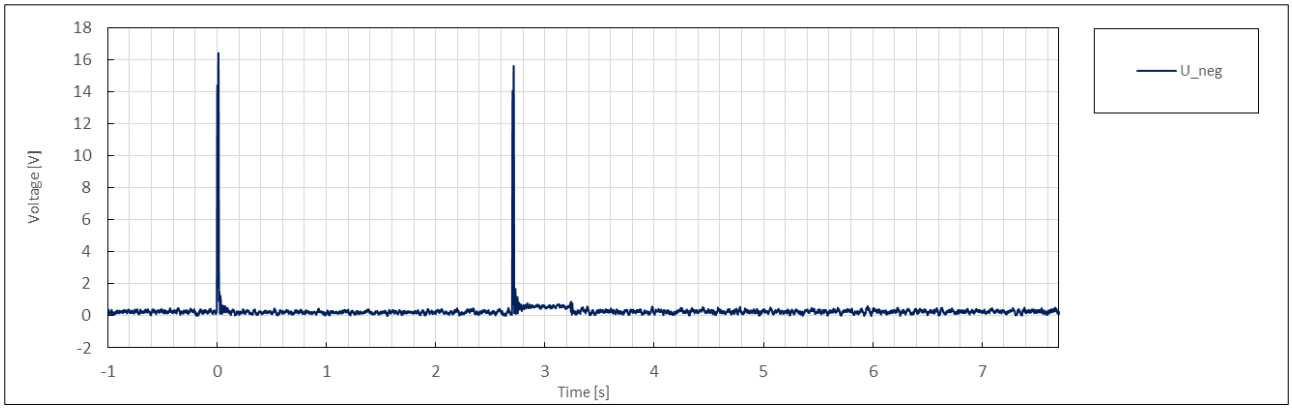


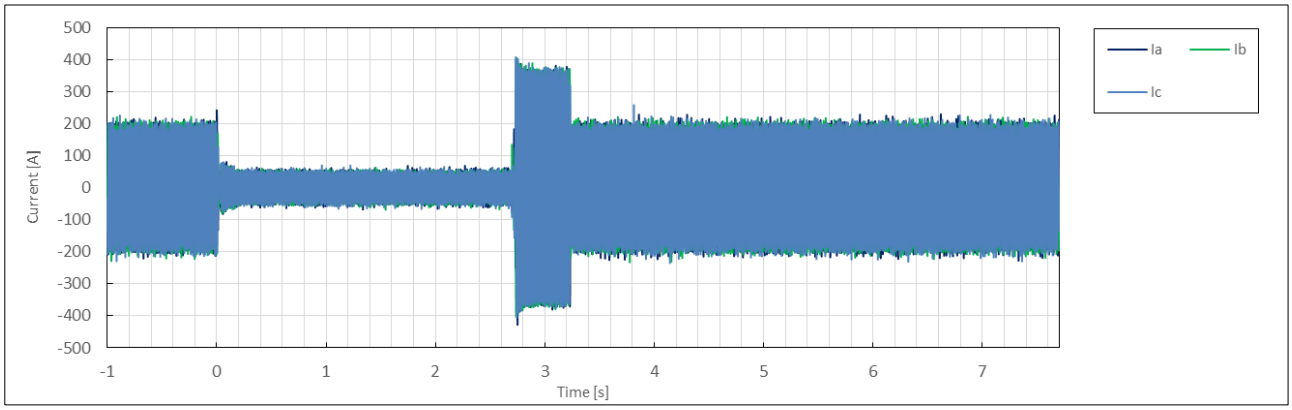
No. 4.5 Load Test

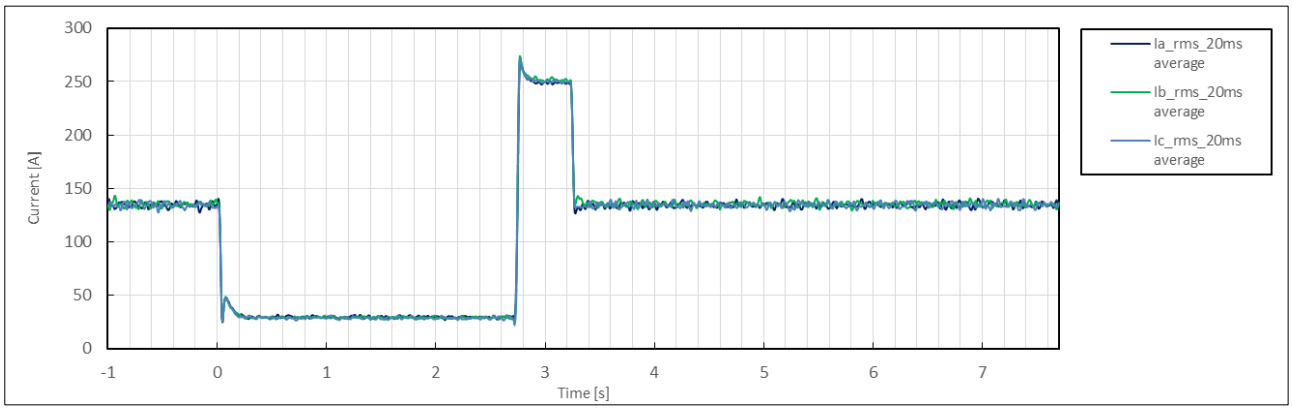


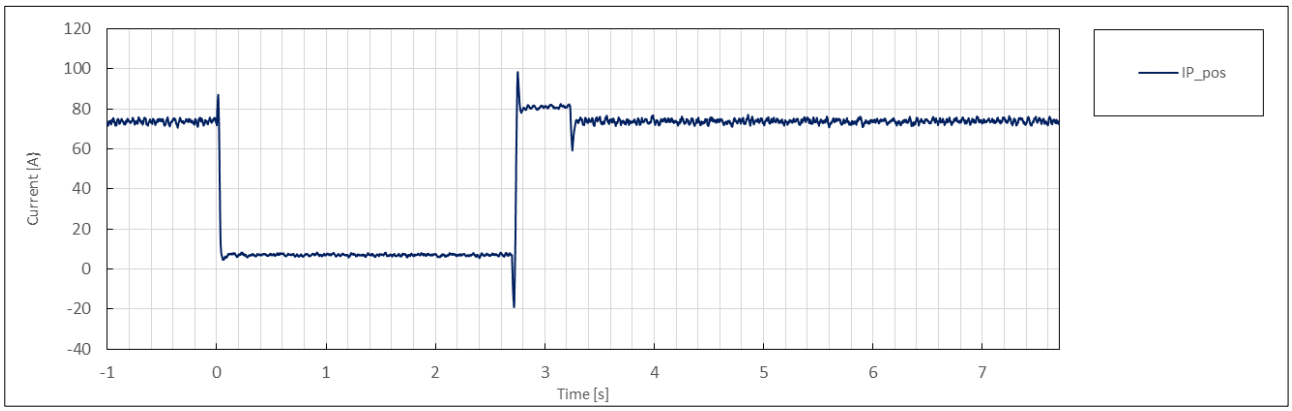


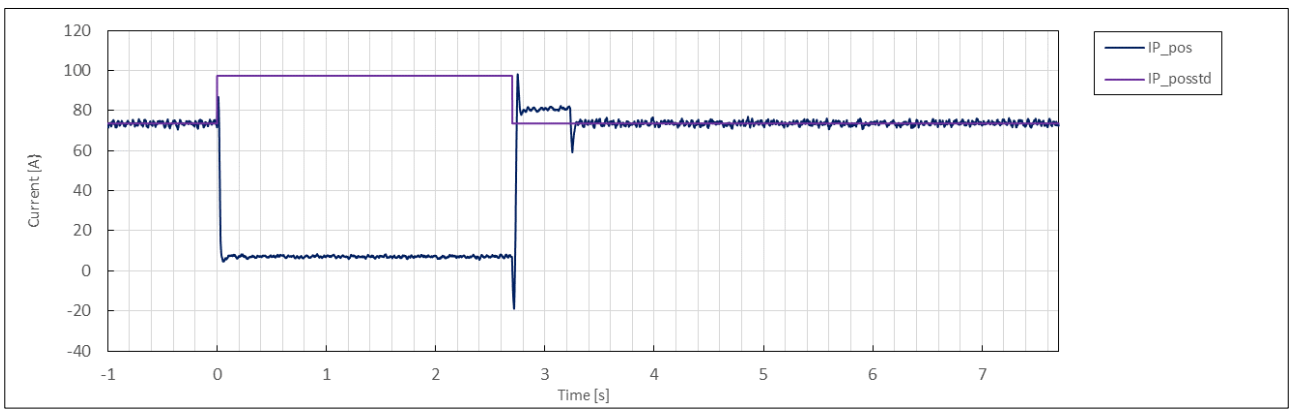


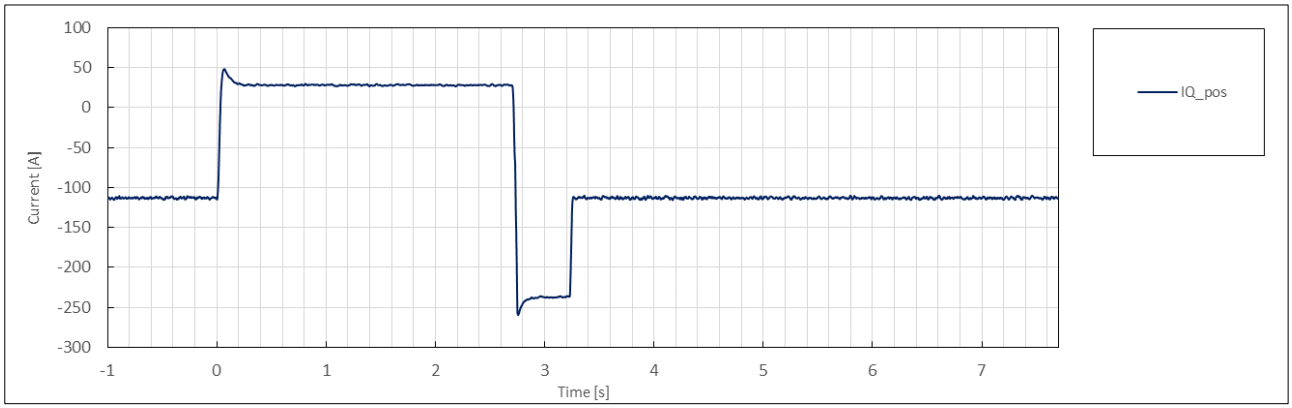


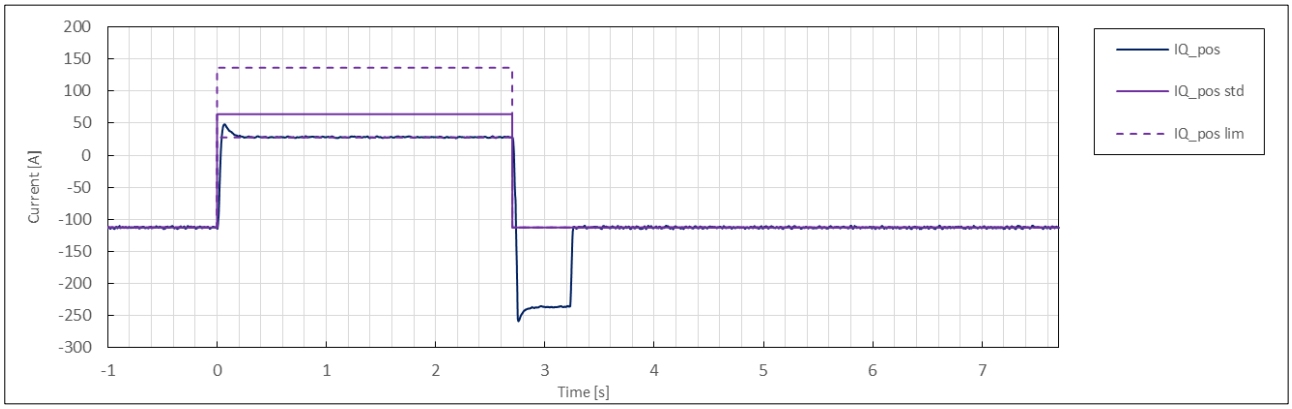

Current [A]
Time [s]
Ia
Ib
Ic

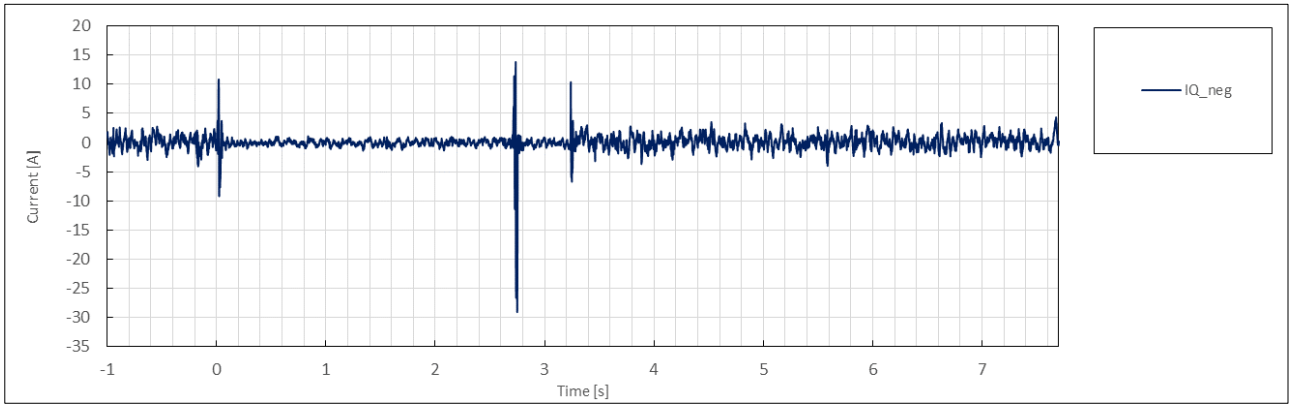

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

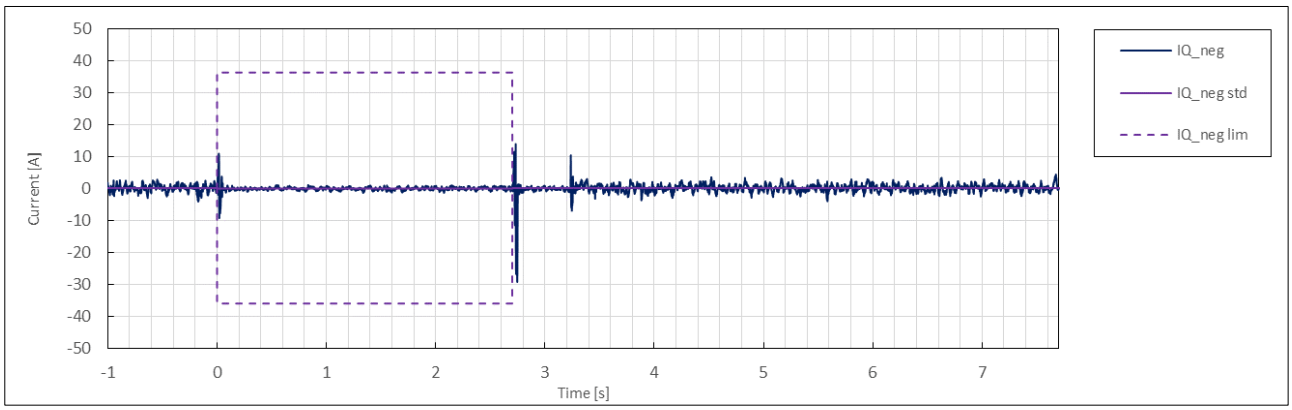

Current [A]
Time [s]
IP_pos

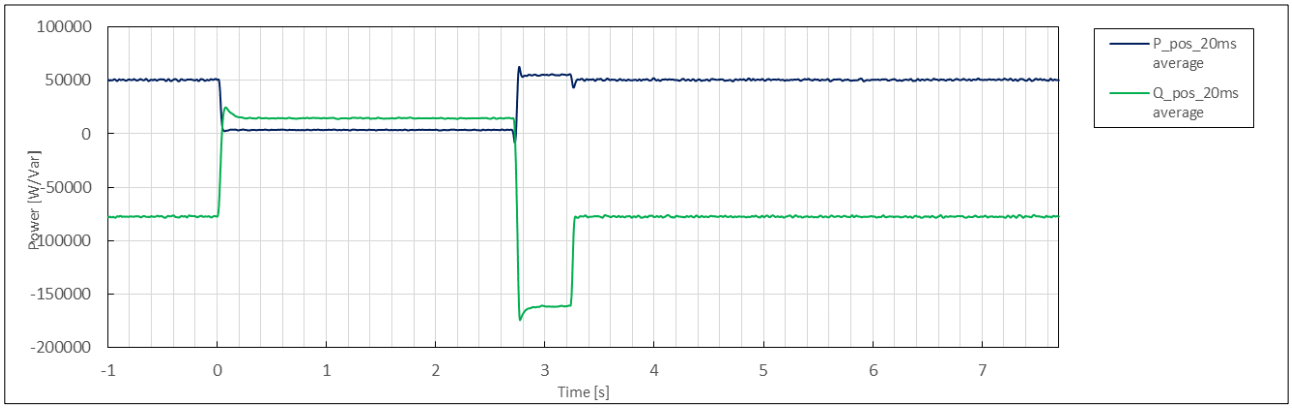

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

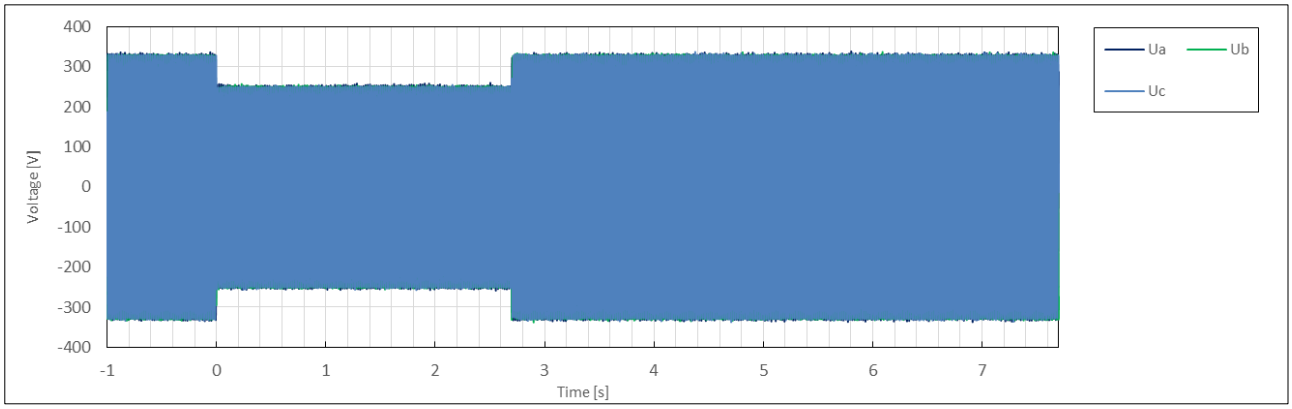

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

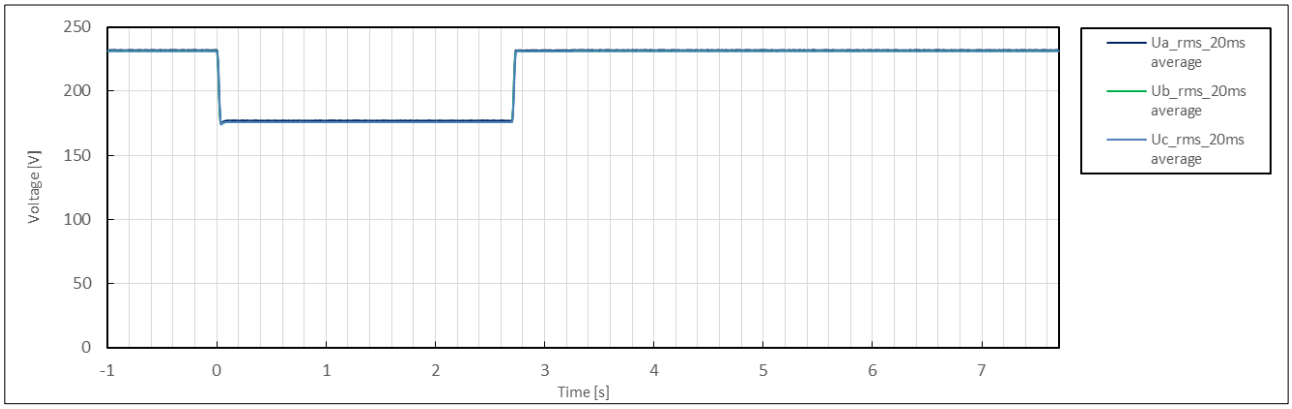

Current [A]
Time [s]
IQ_neg

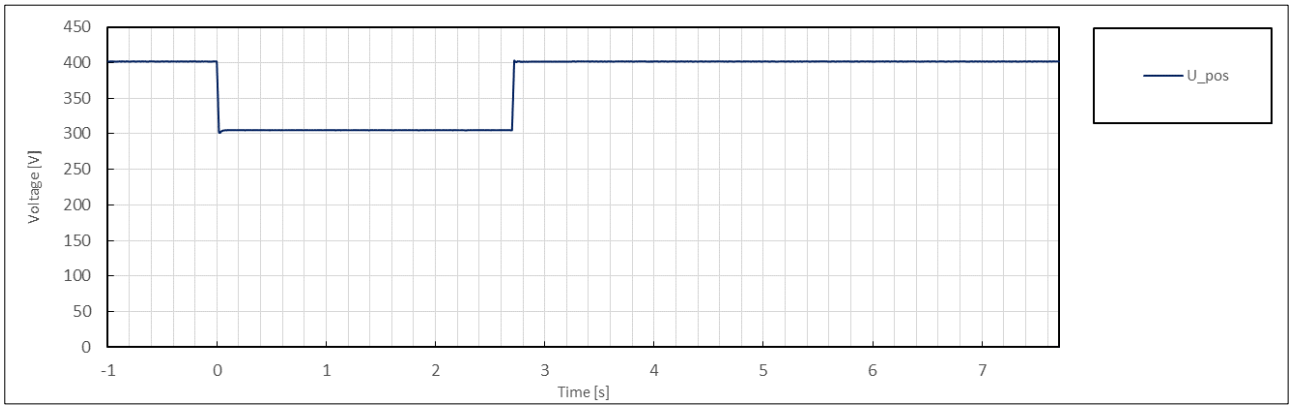

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim



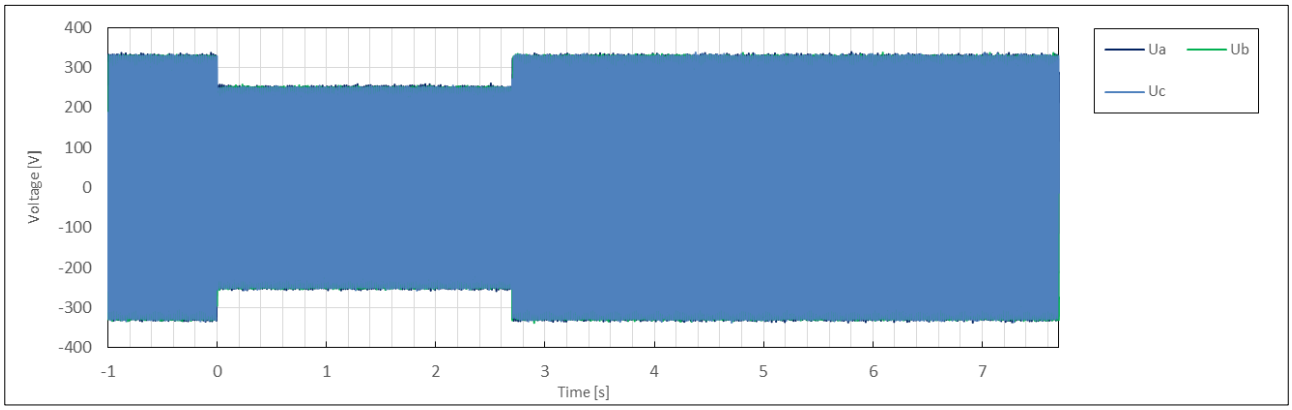
No. 4.6 Idle Test

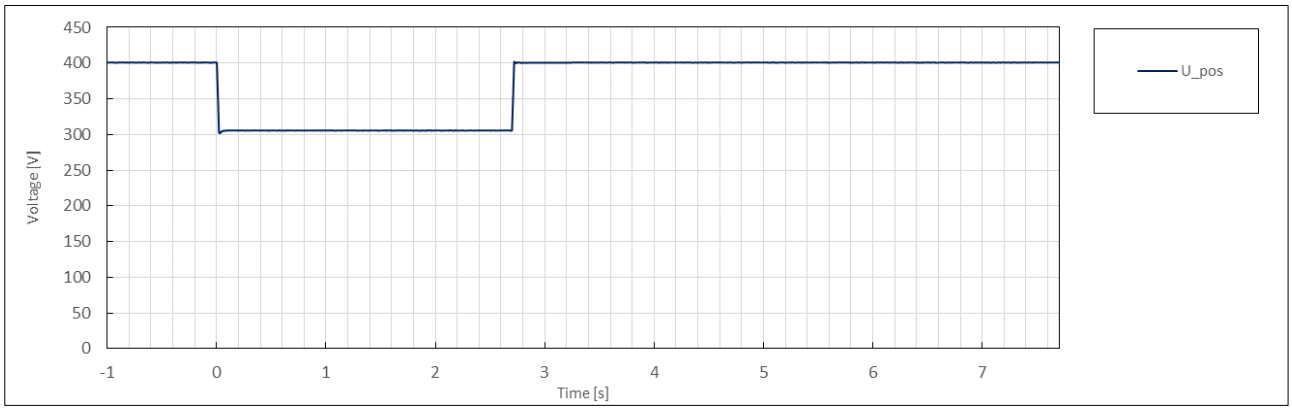


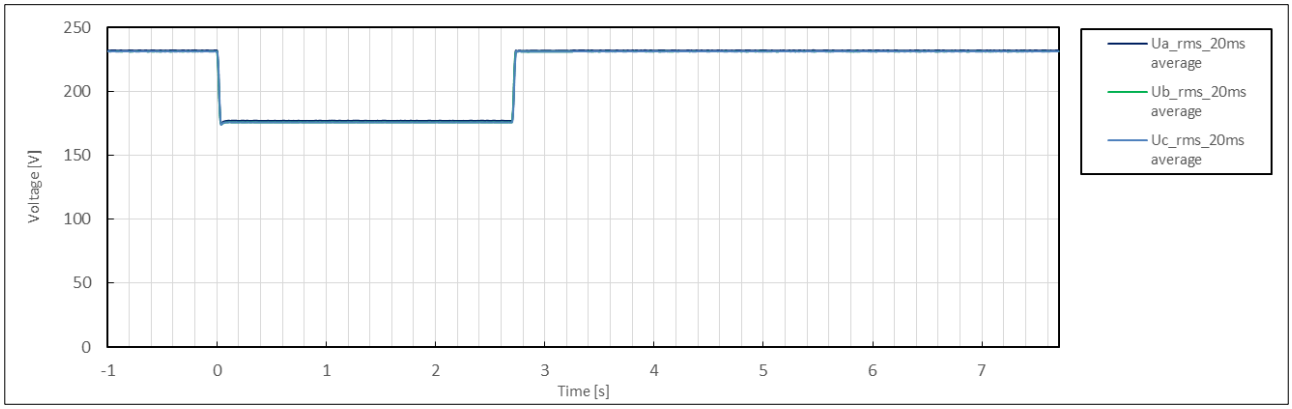


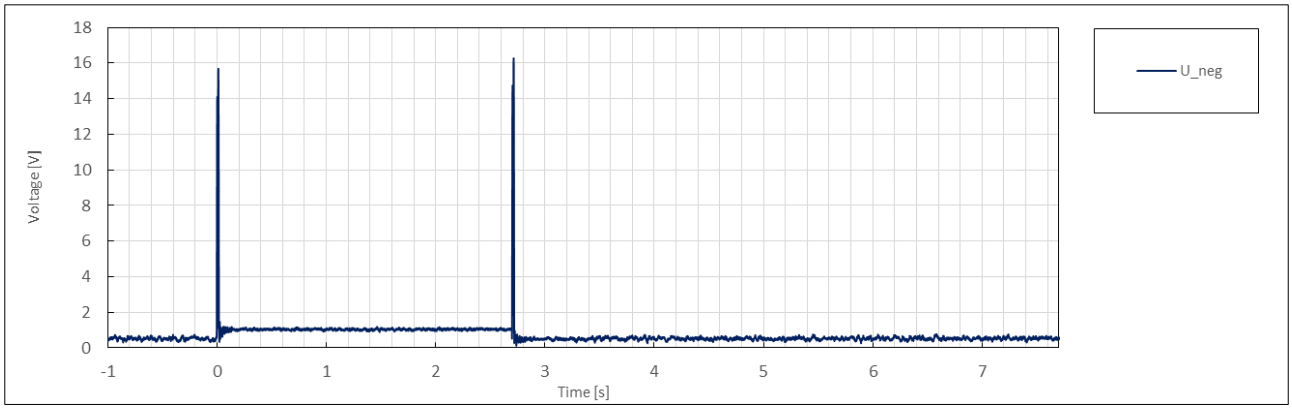


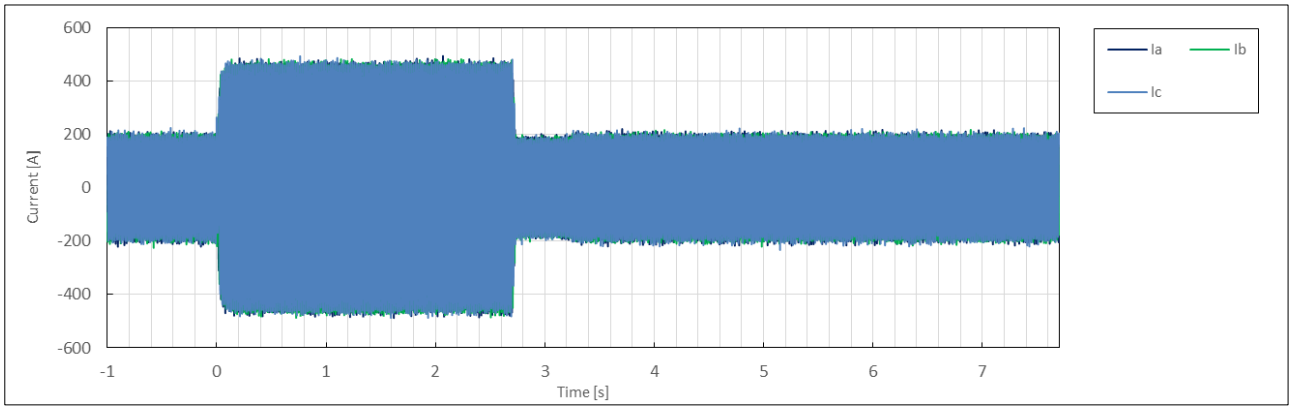
No. 4.6 Load Test

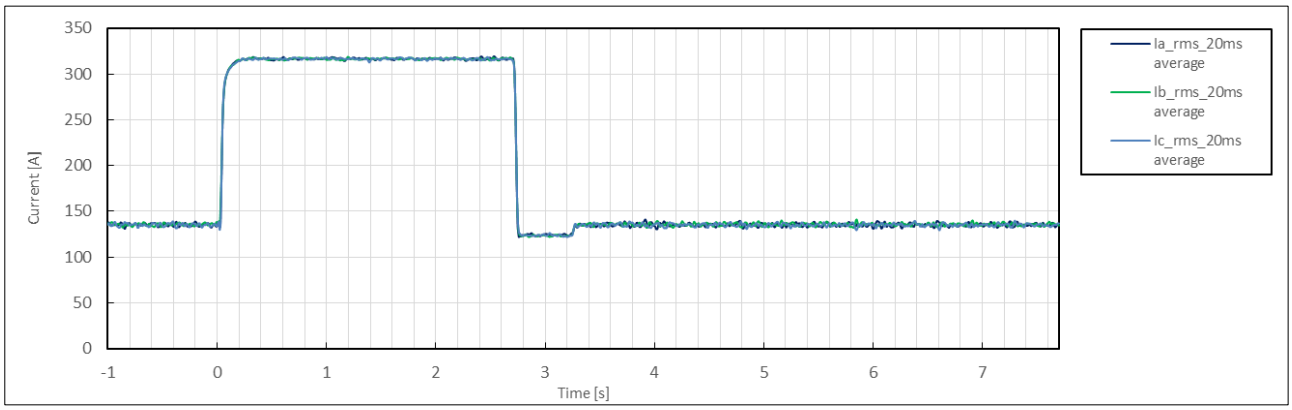


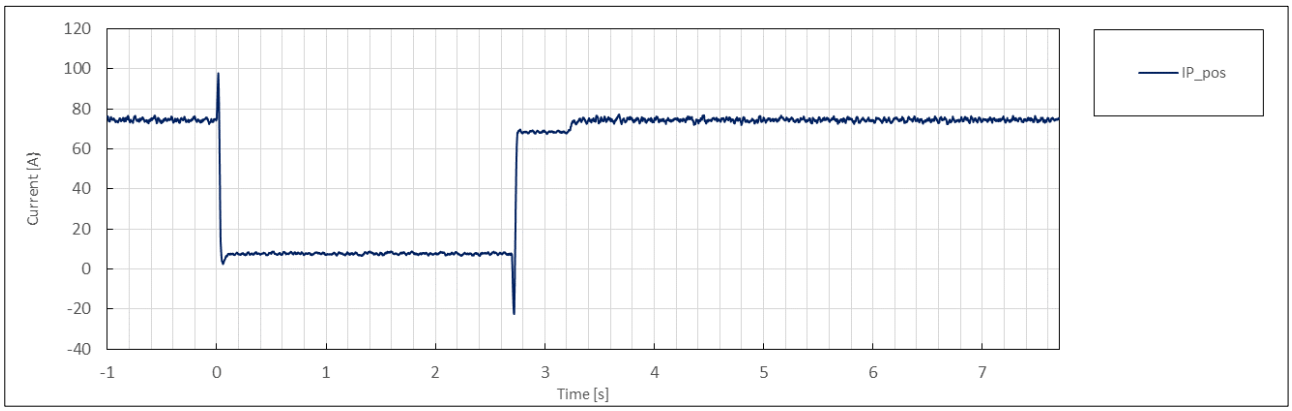


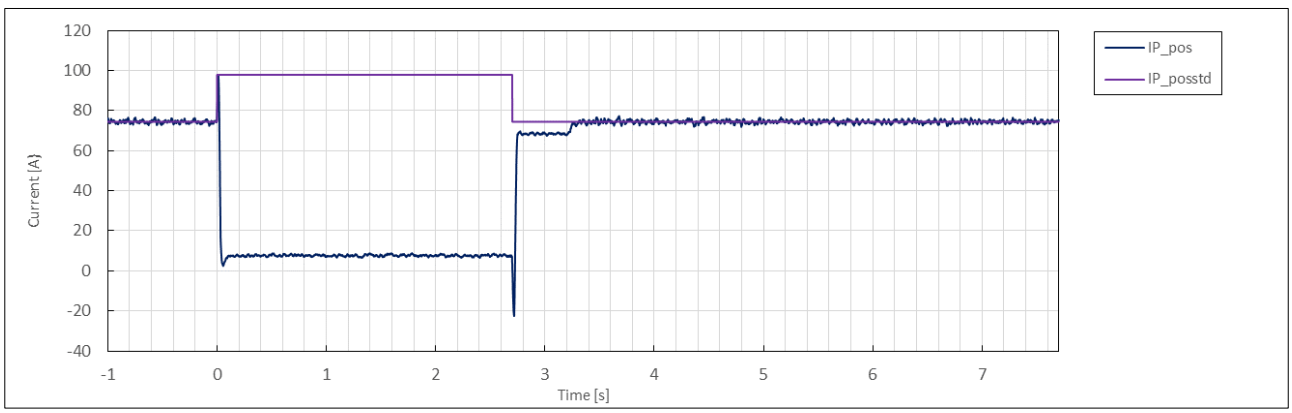


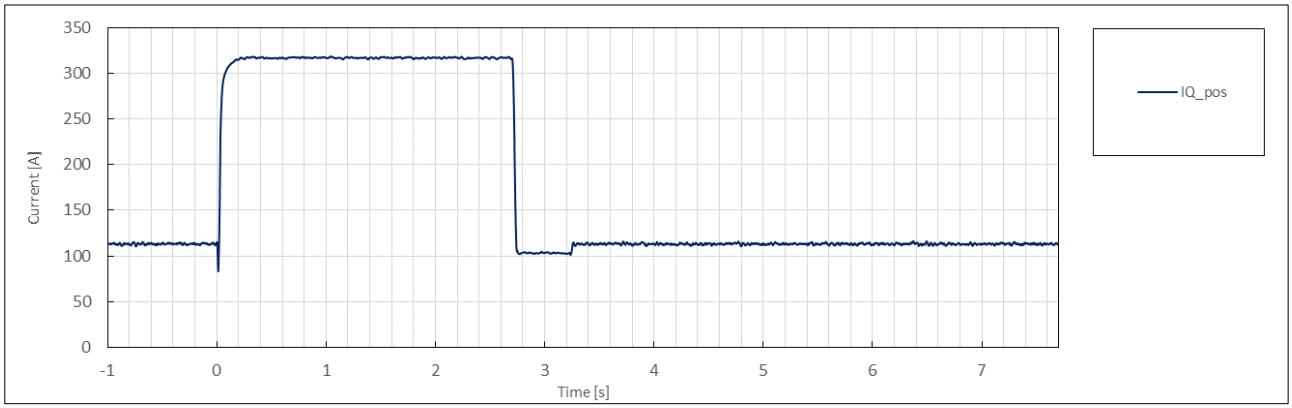


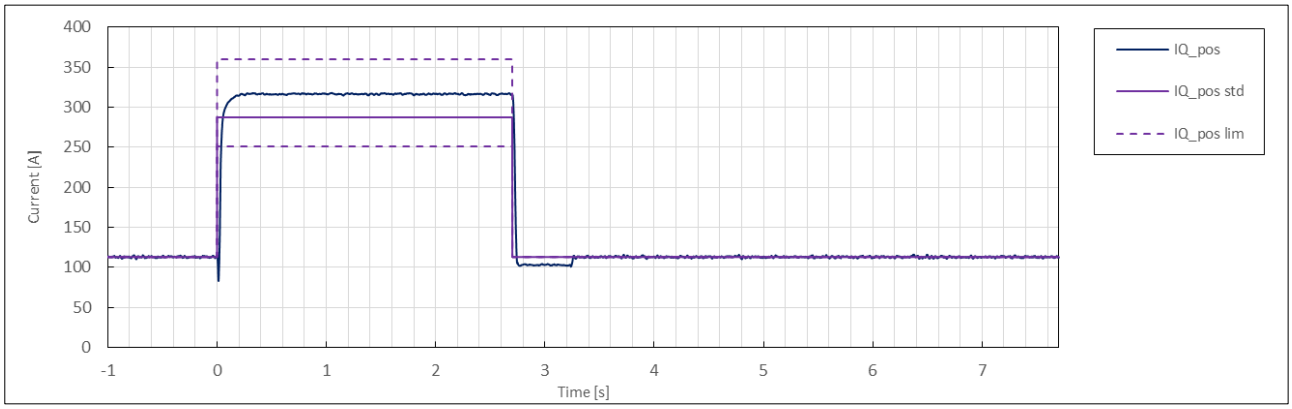

Current [A]
Time [s]
Ia
Ib
Ic

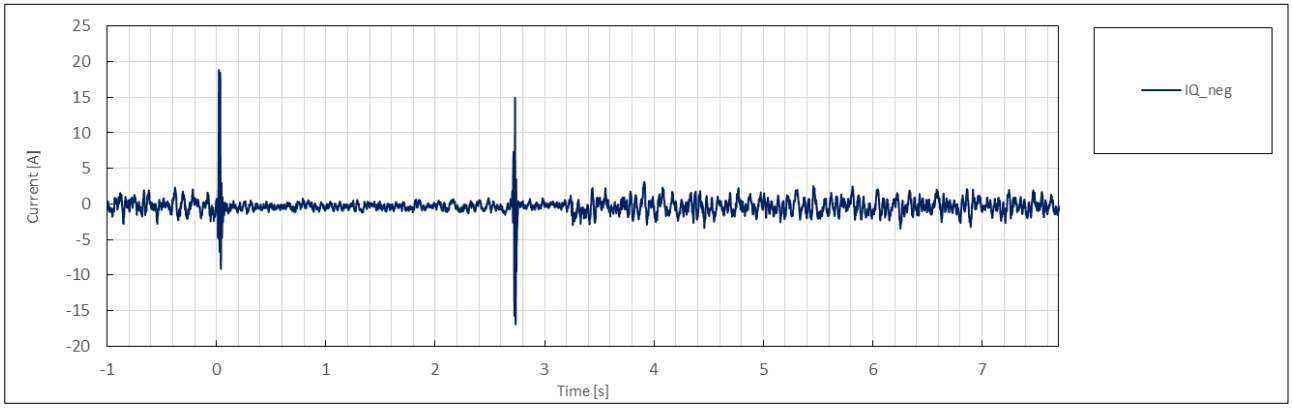

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

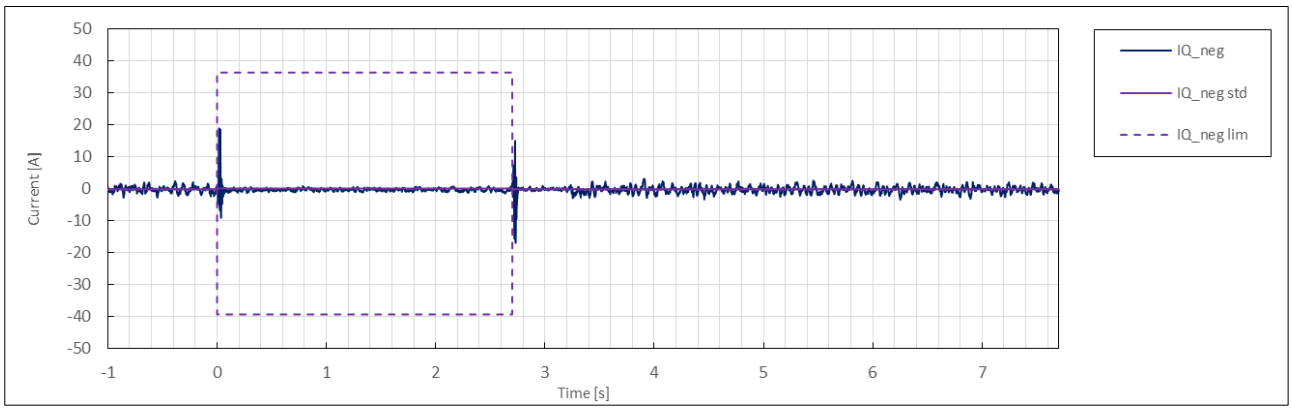

Current [A]
Time [s]
IP_pos

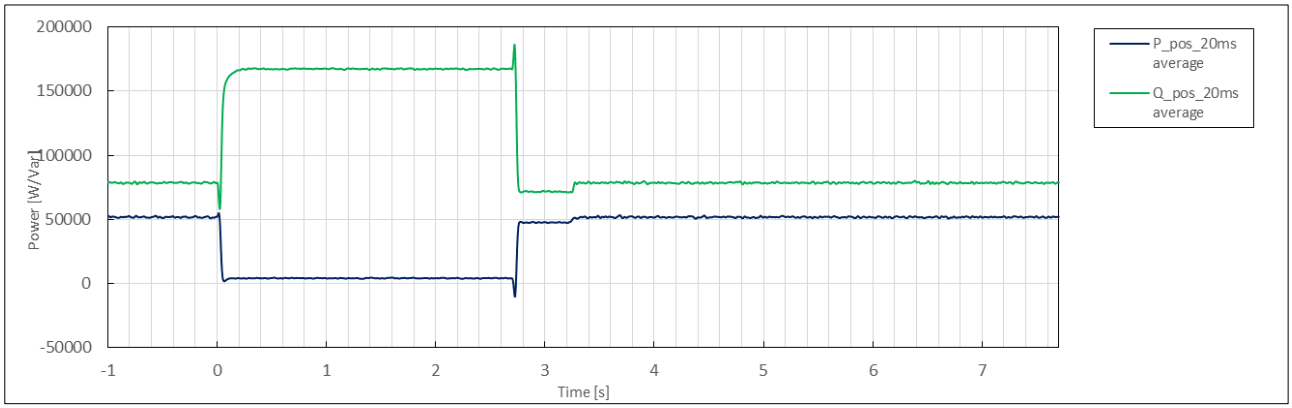

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

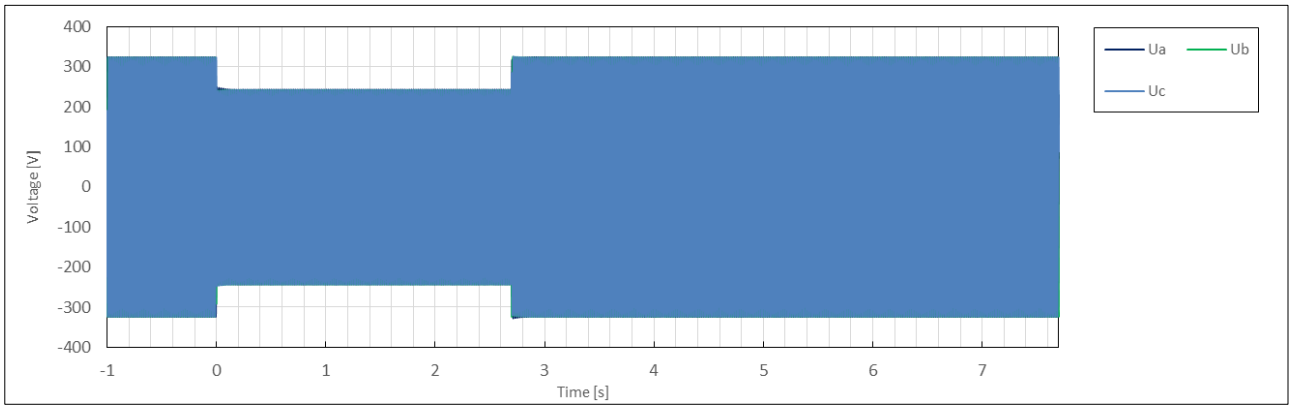

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

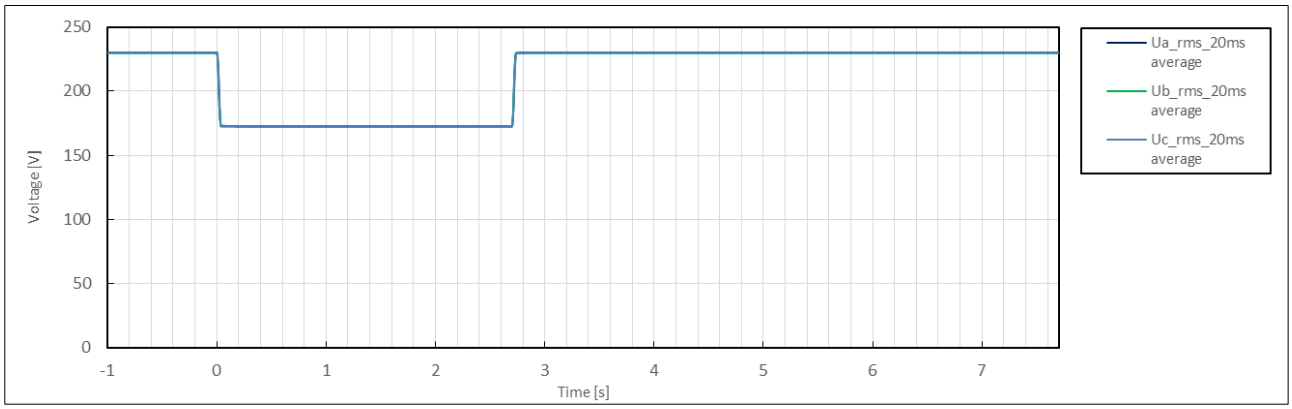

Current [A]
Time [s]
IQ_neg

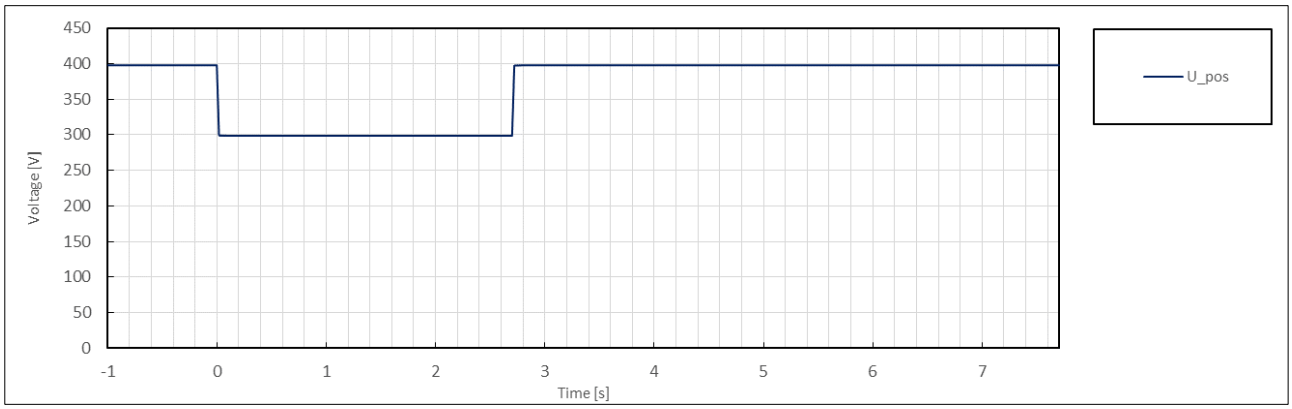

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
Time [s]
P_pos_20ms average
Q_pos_20ms average

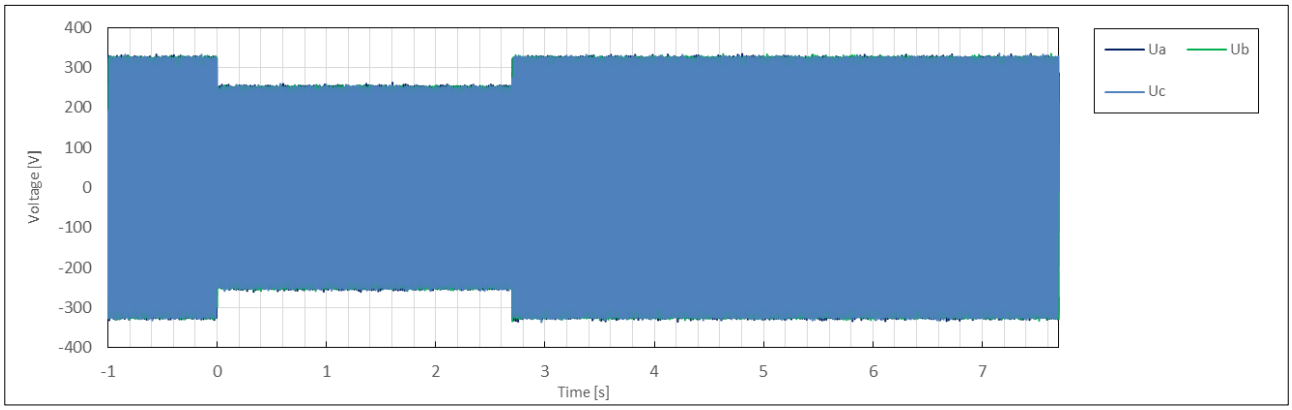
No. 4.7 Idle Test

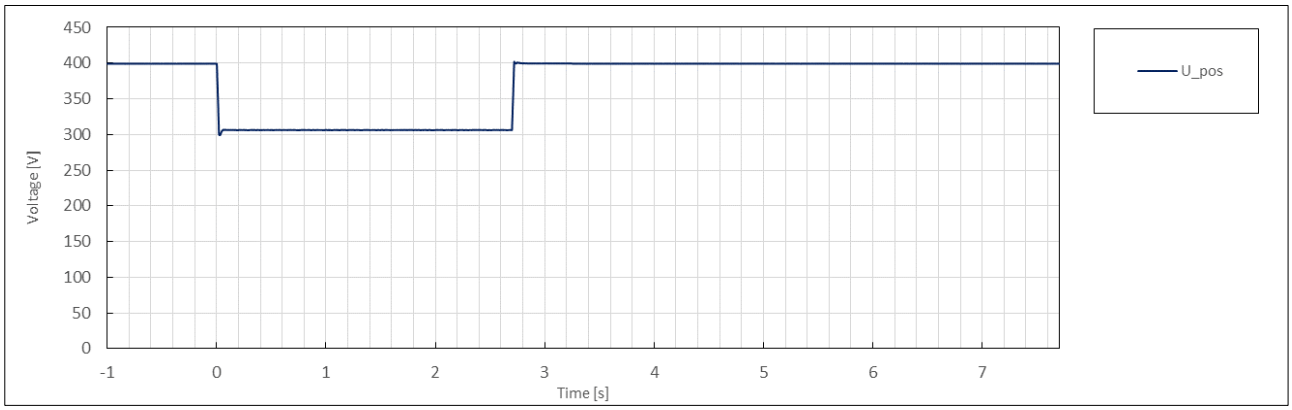


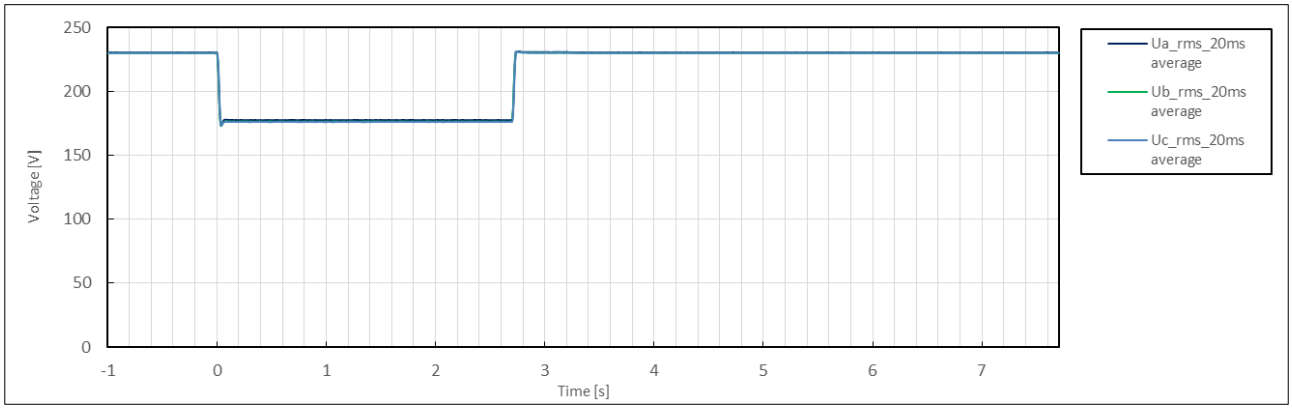


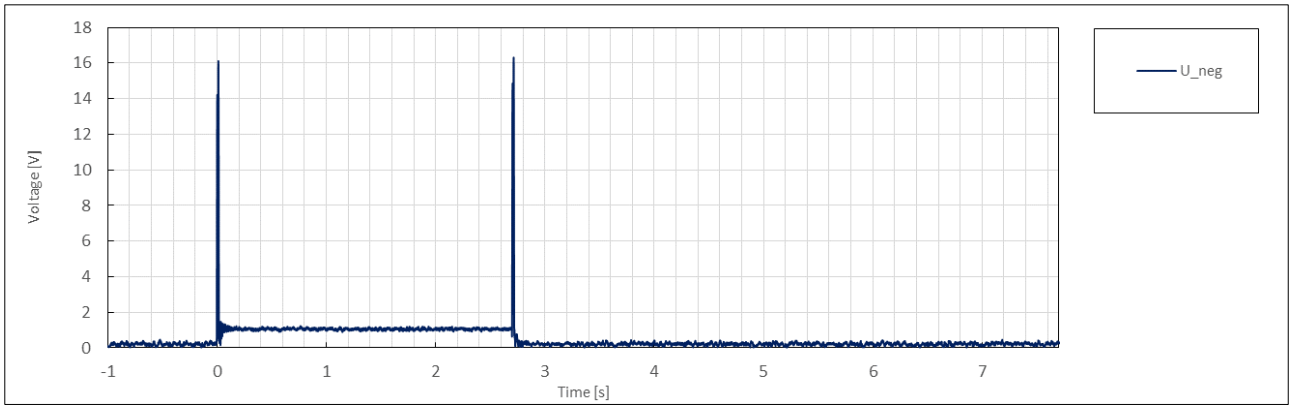


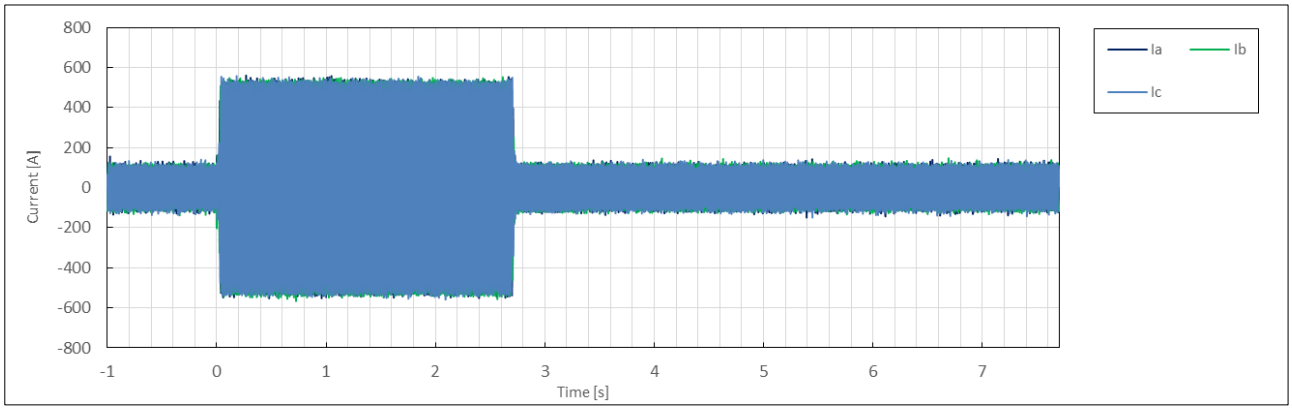
No. 4.7 Load Test

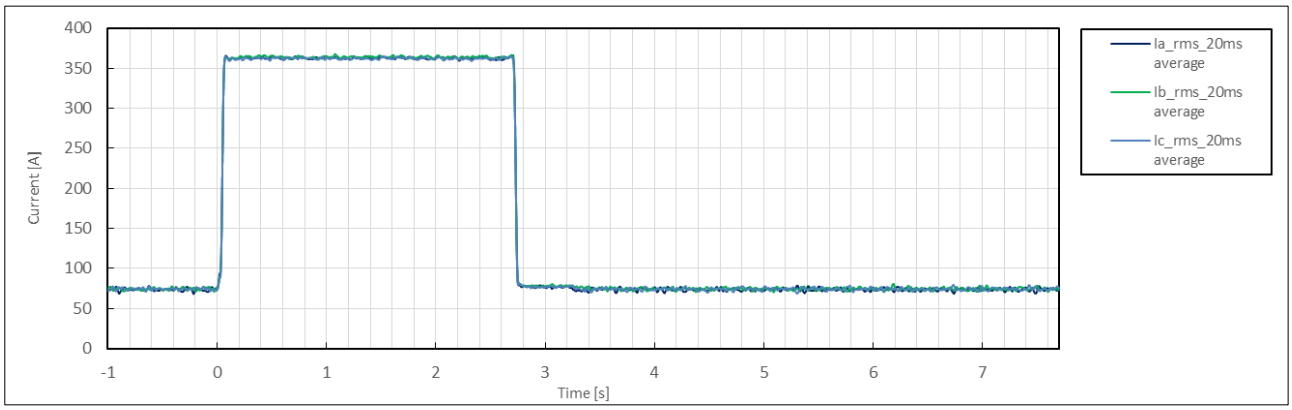


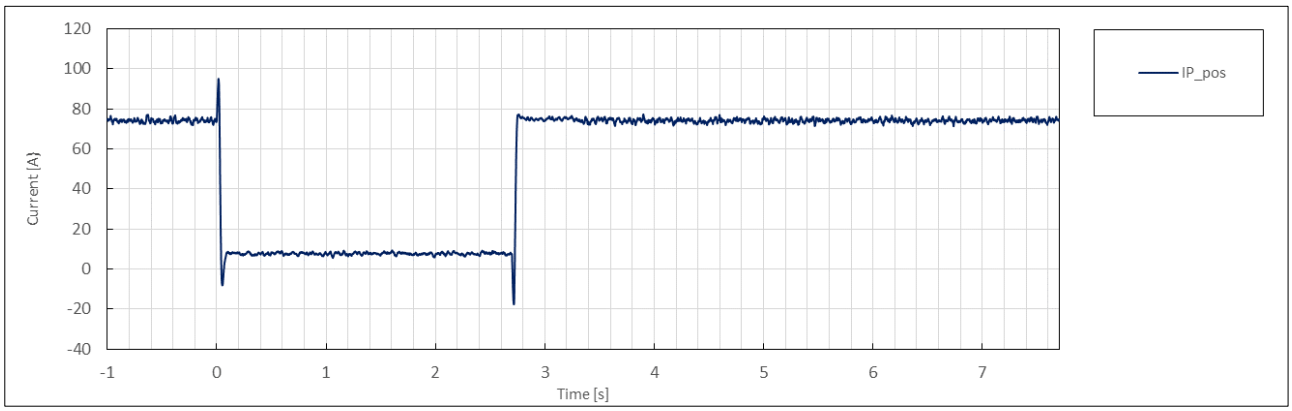


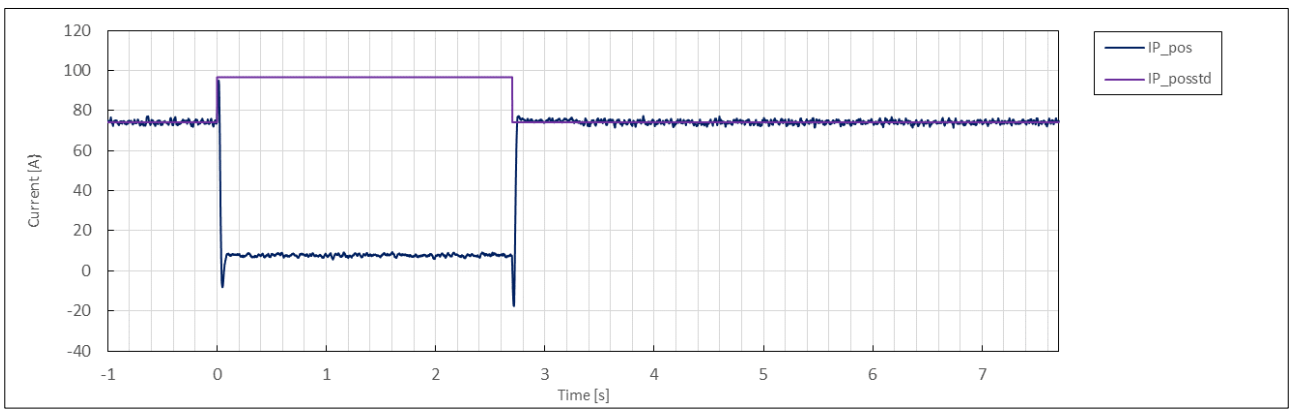


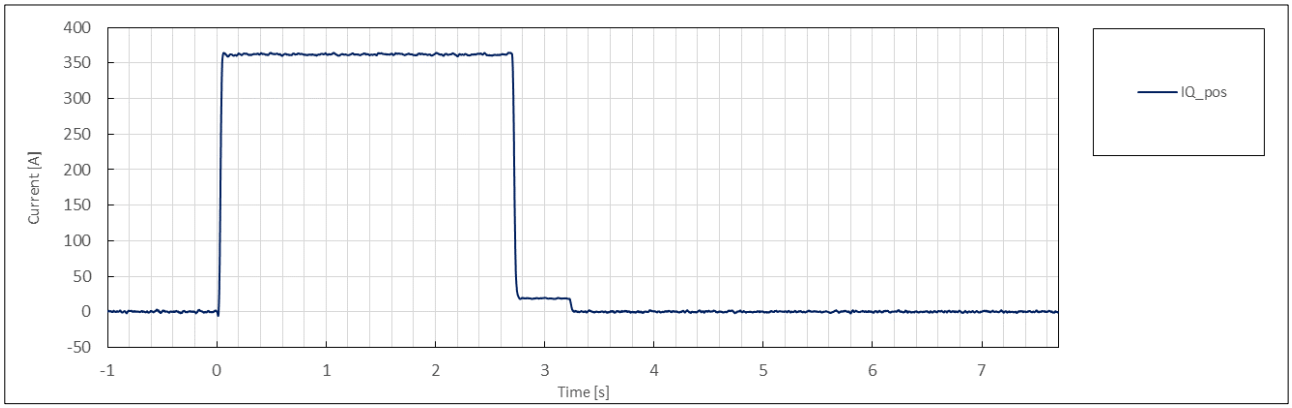


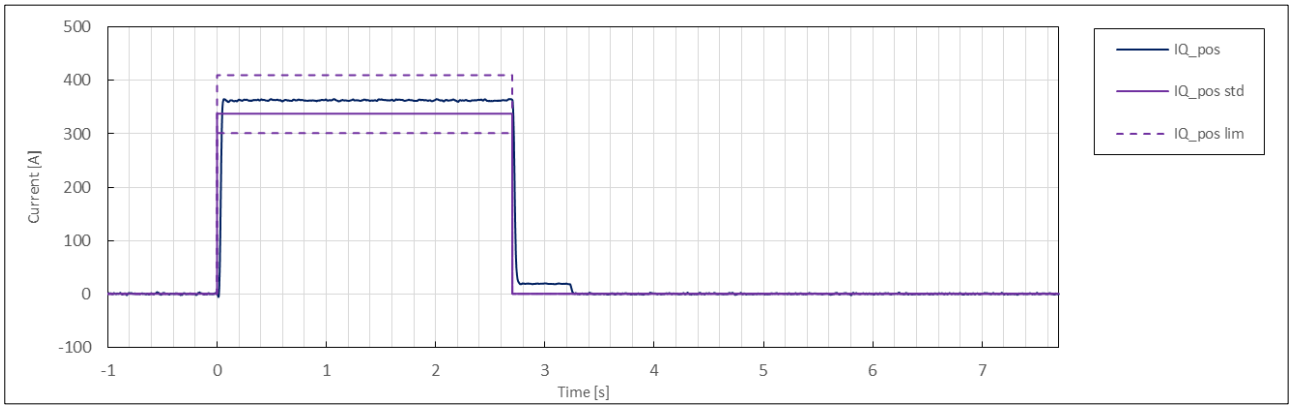

Current [A]
Time [s]
Ia
Ib
Ic

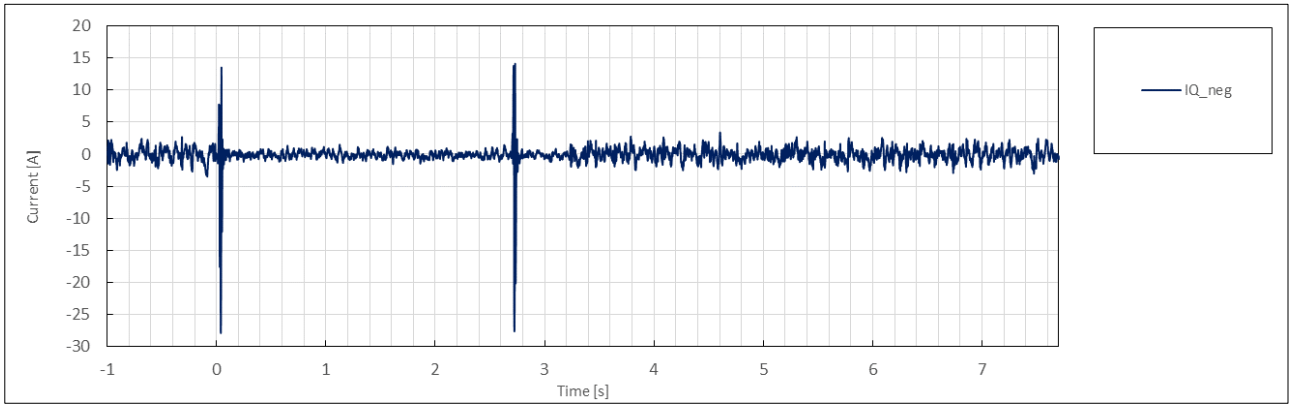

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

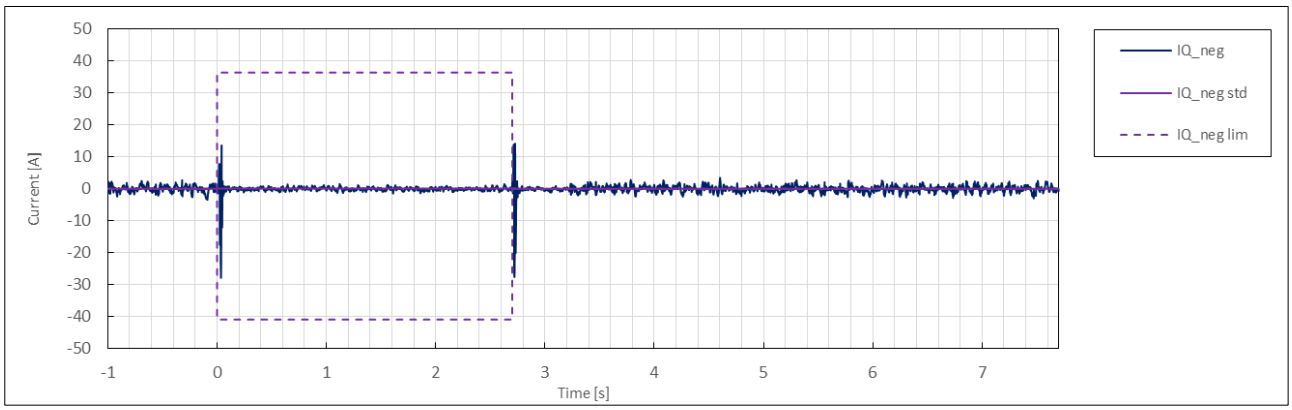

Current [A]
Time [s]
IP_pos

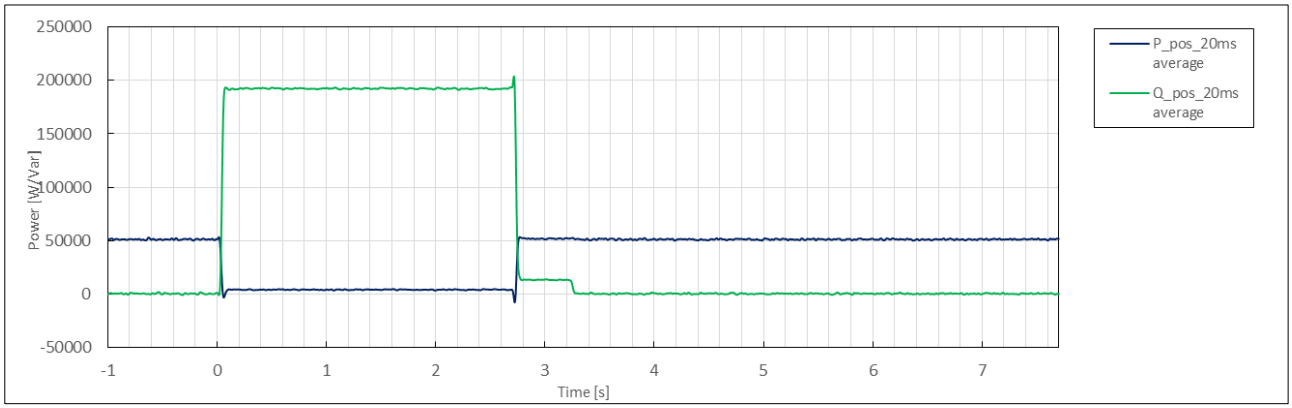

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

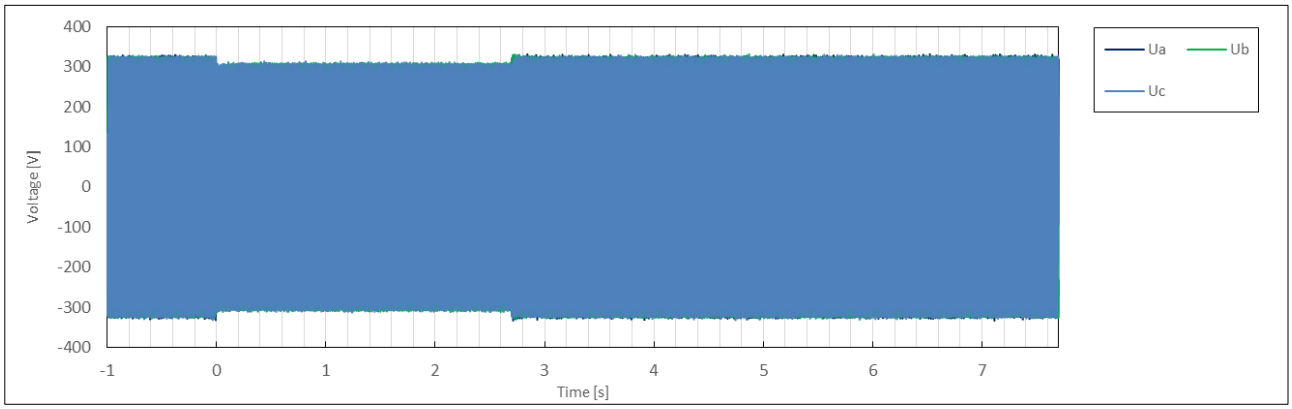

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

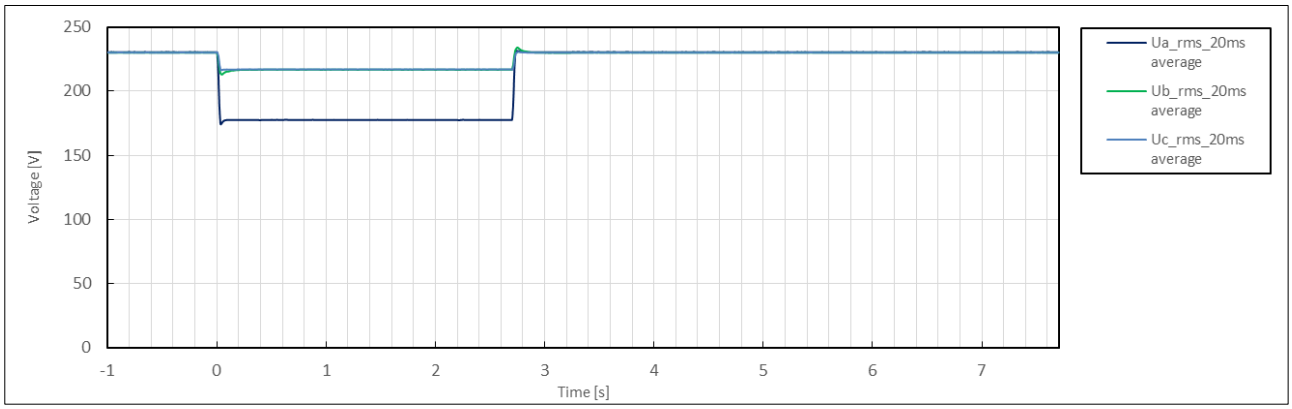

Current [A]
Time [s]
IQ_neg

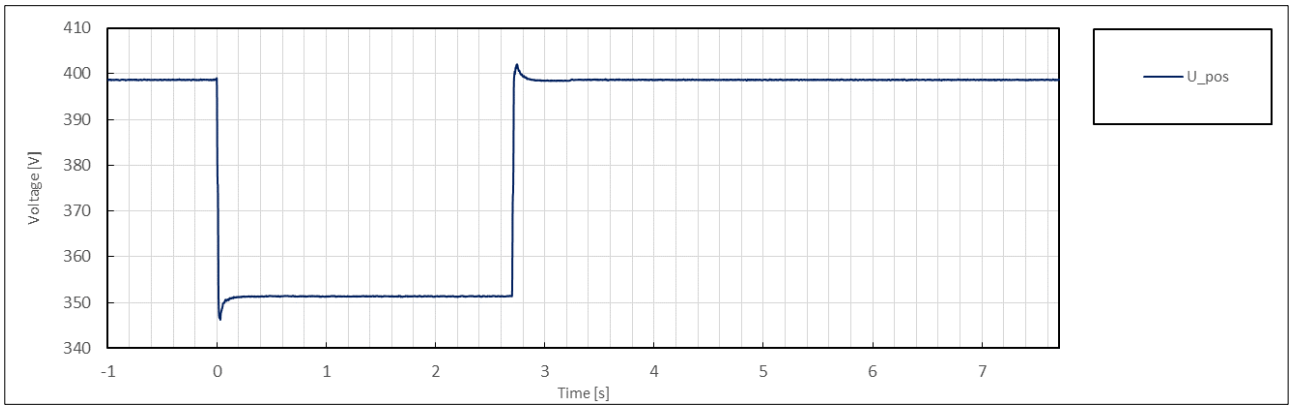

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
Time [s]
P_pos_20ms average
Q_pos_20ms average

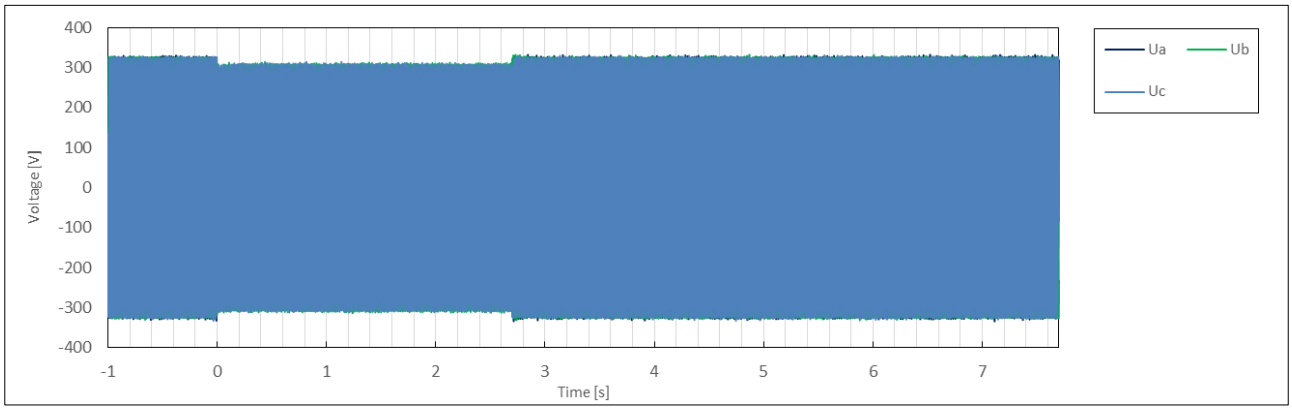
No. 4.8 Idle Test

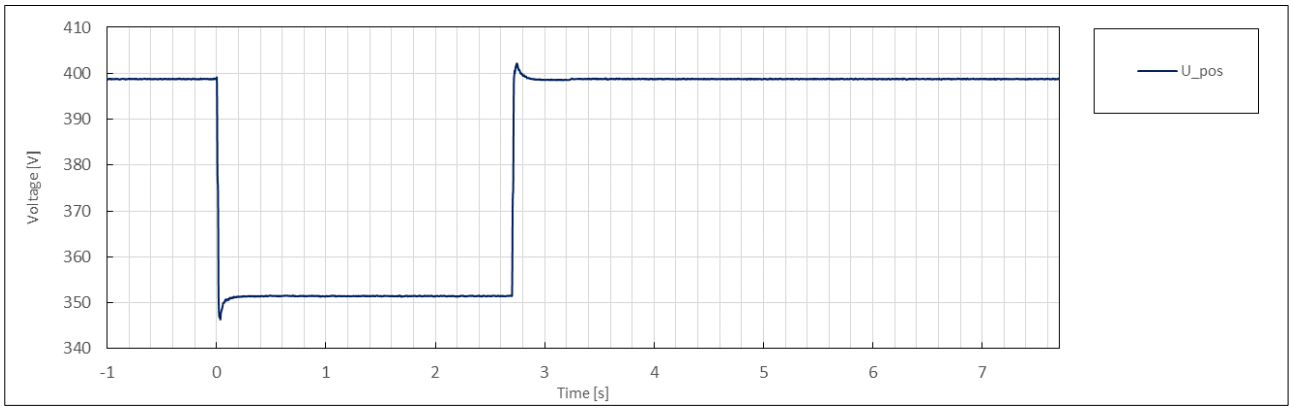


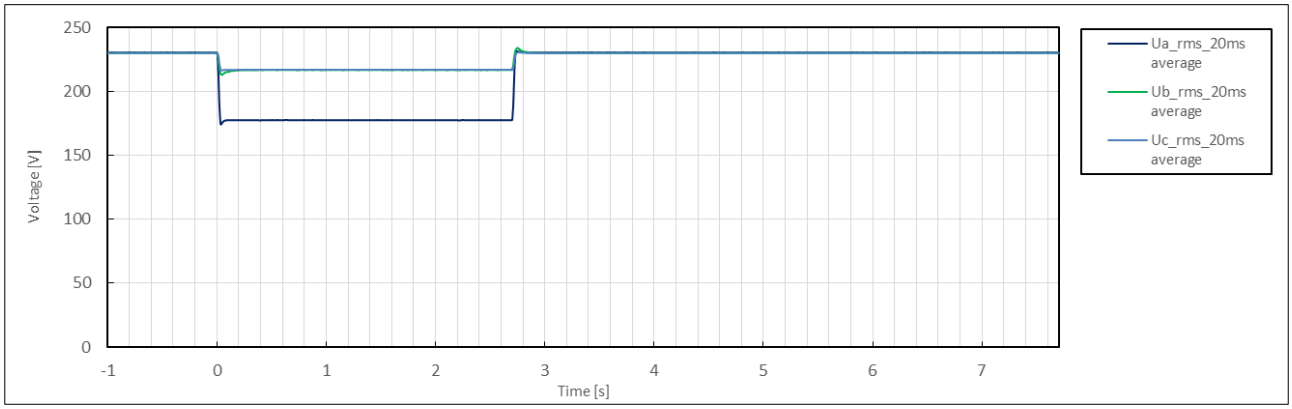


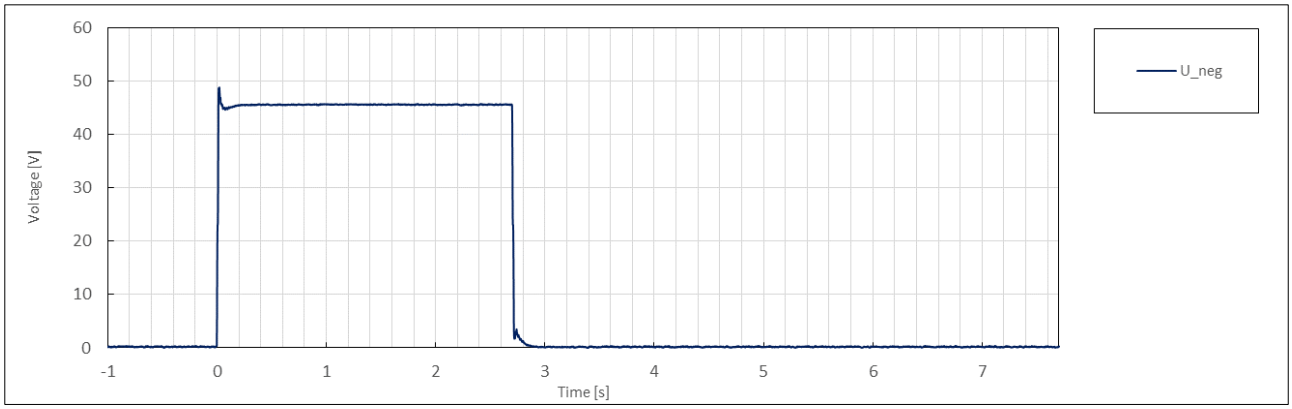


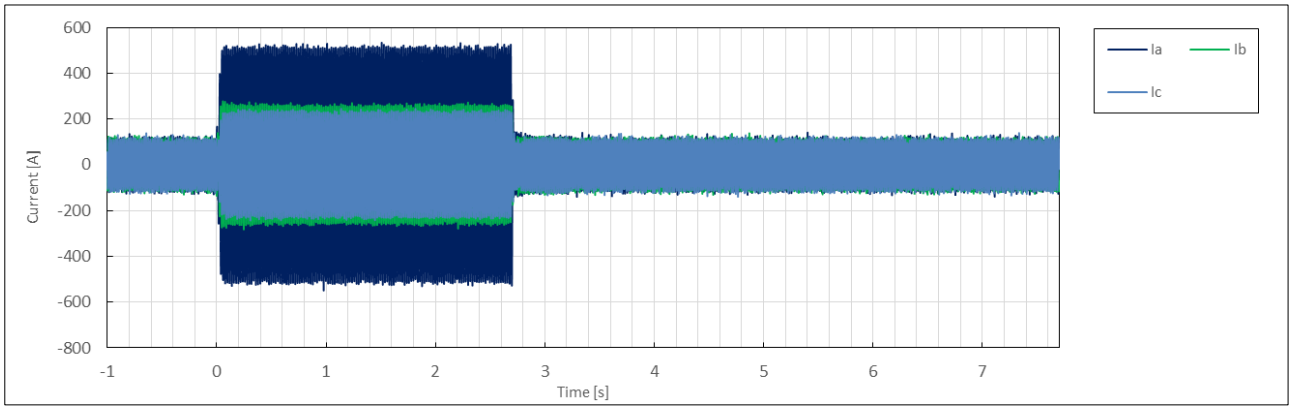
No. 4.8 Load Test

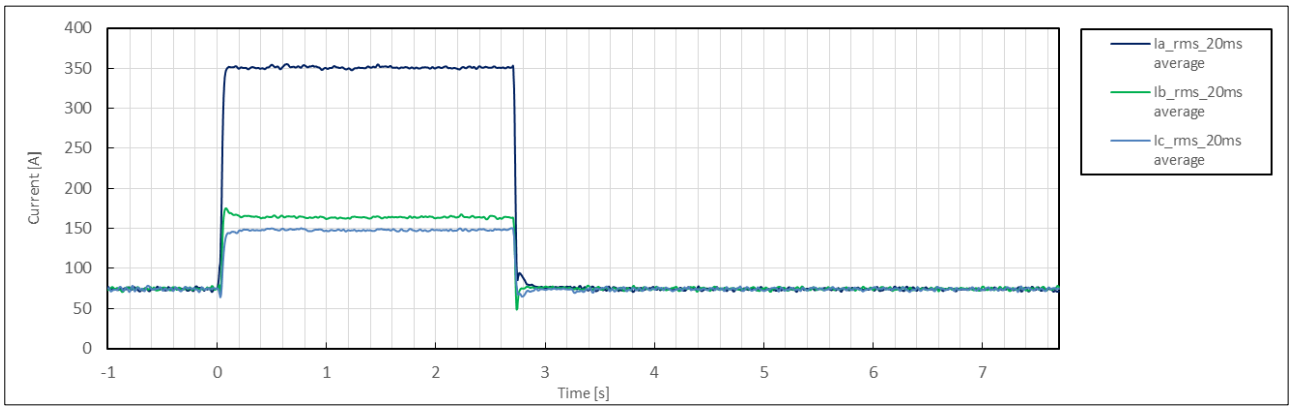


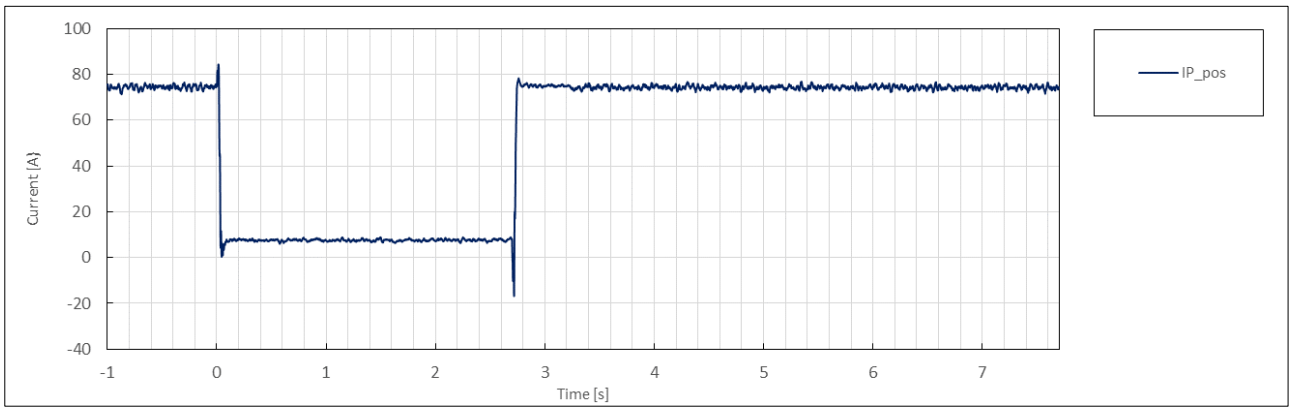


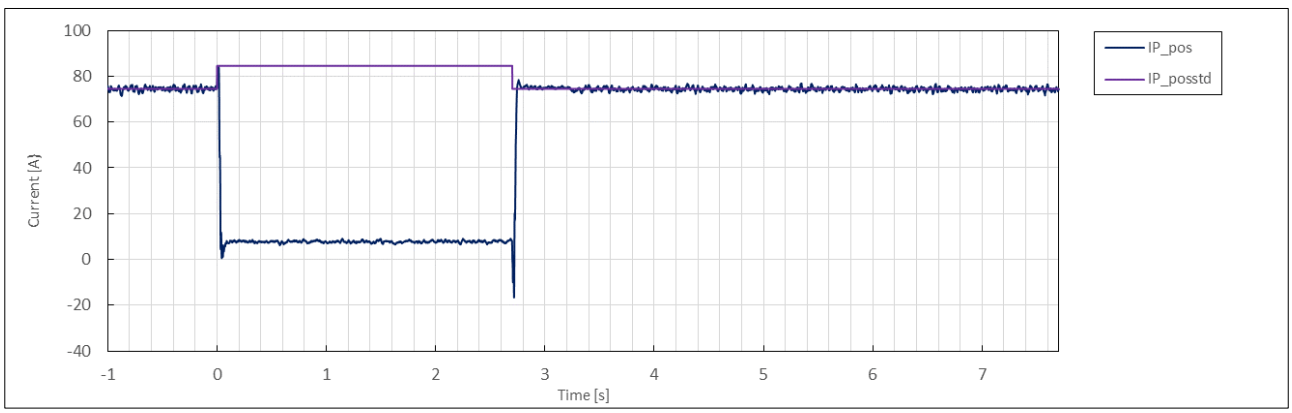


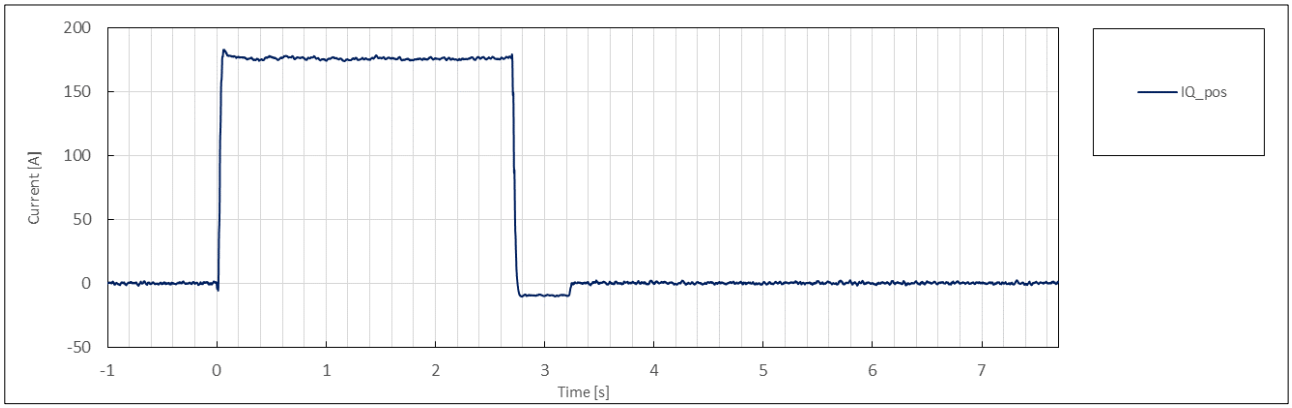


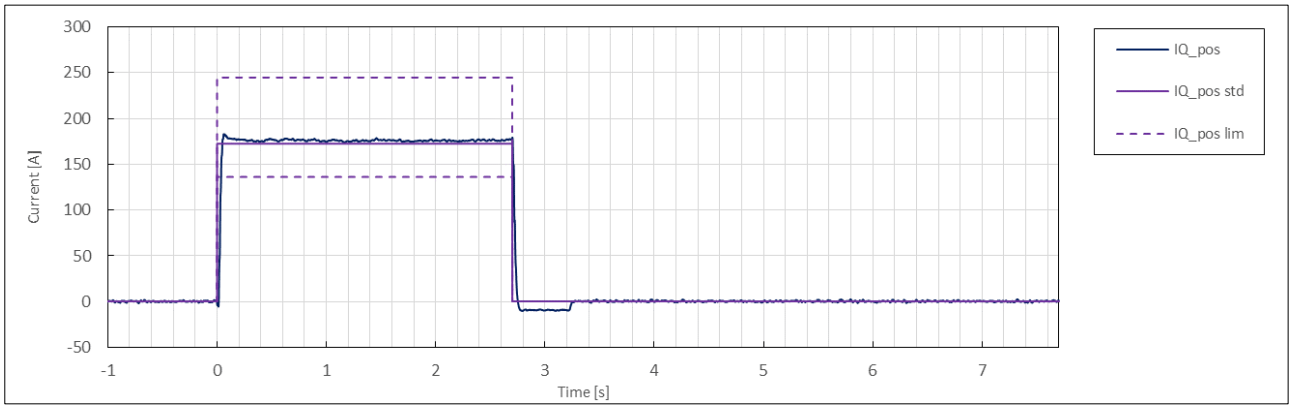

Current [A]
Time [s]
Ia
Ib
Ic

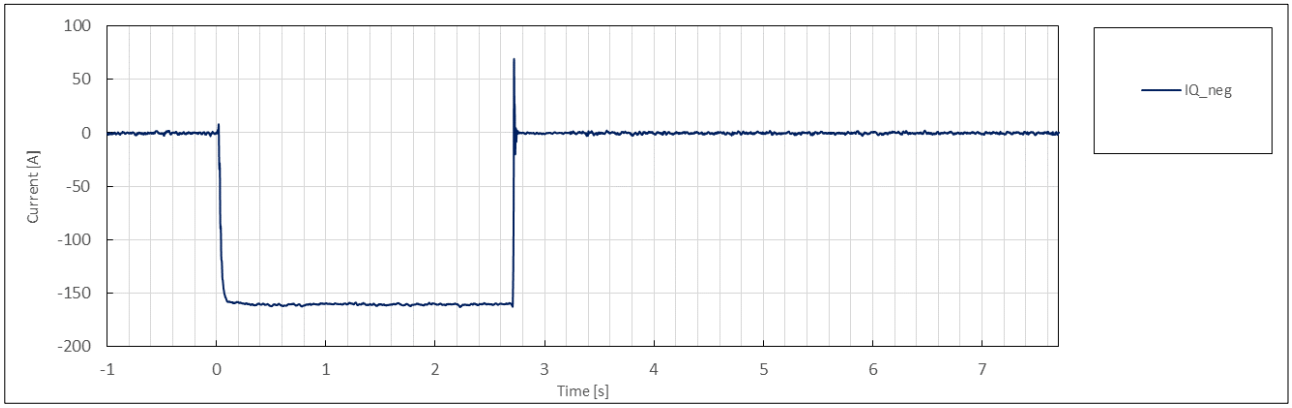

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

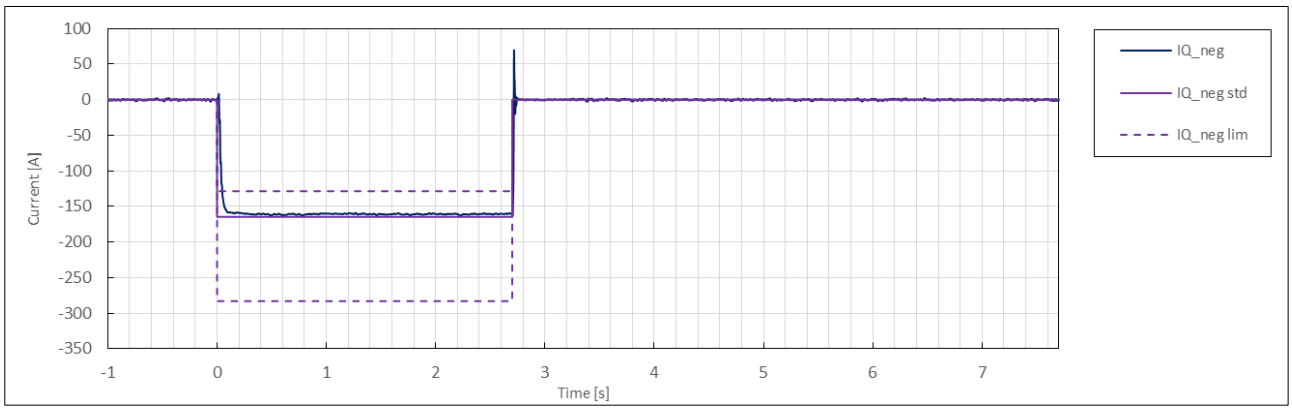

Current [A]
Time [s]
IP_pos

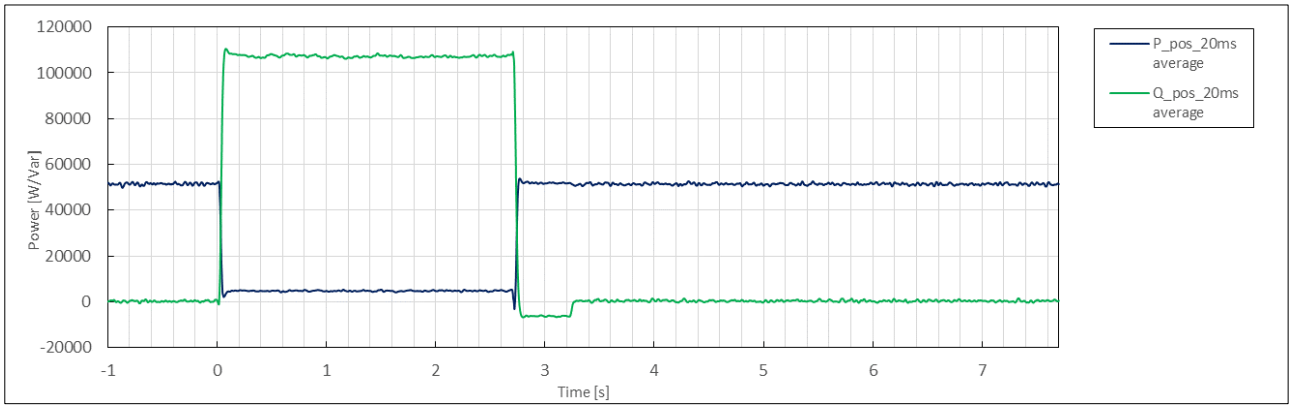

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

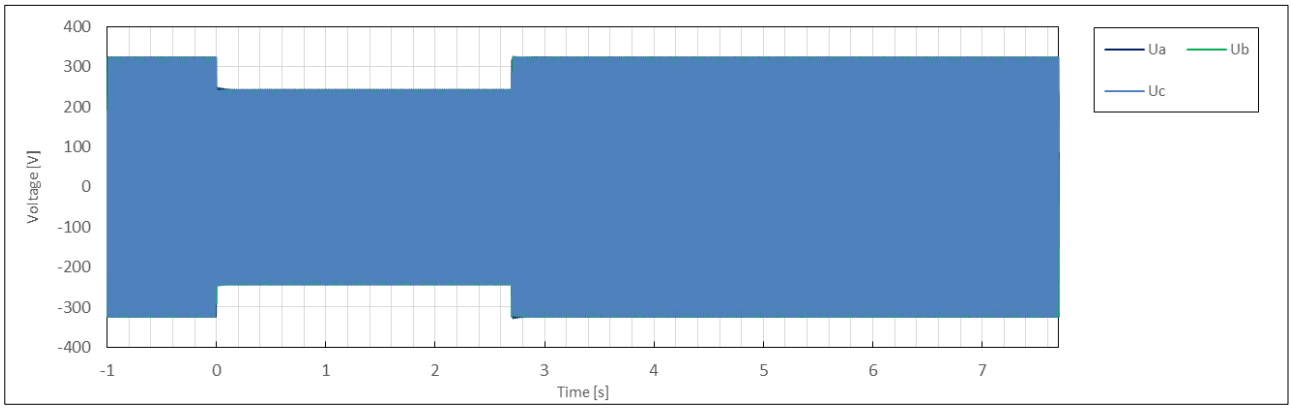

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

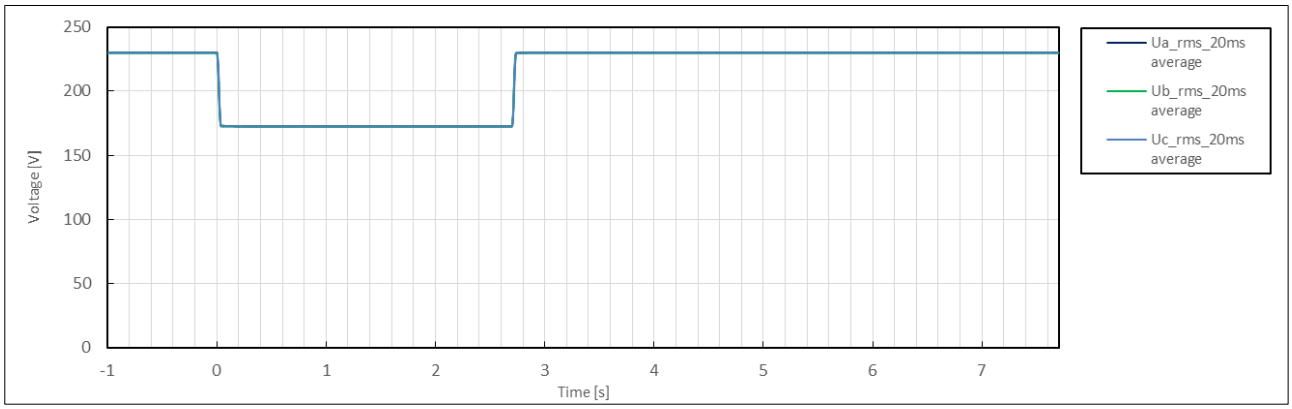

Current [A]
Time [s]
IQ_neg

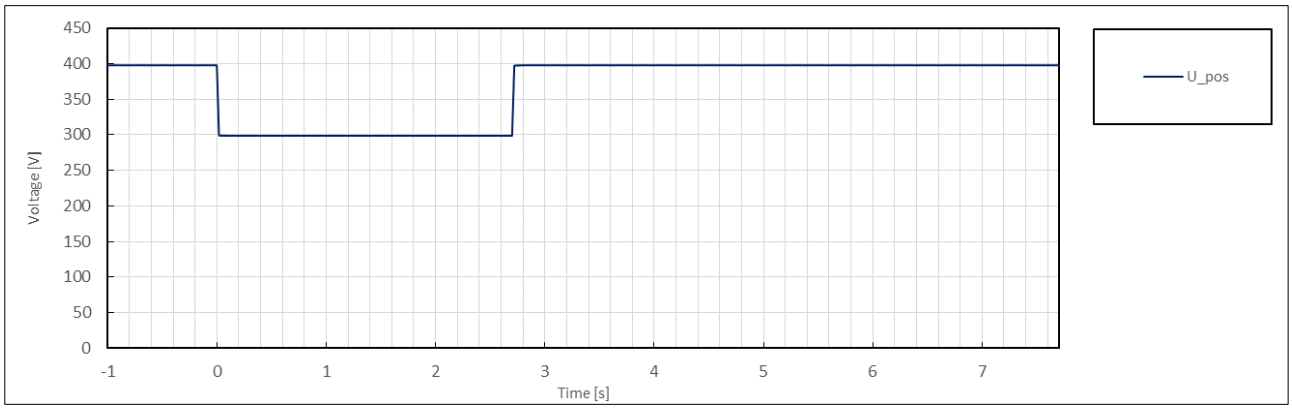

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


120000
100000
80000
60000
40000
20000
0
-20000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
Time [s]
P_pos_20ms average
Q_pos_20ms average

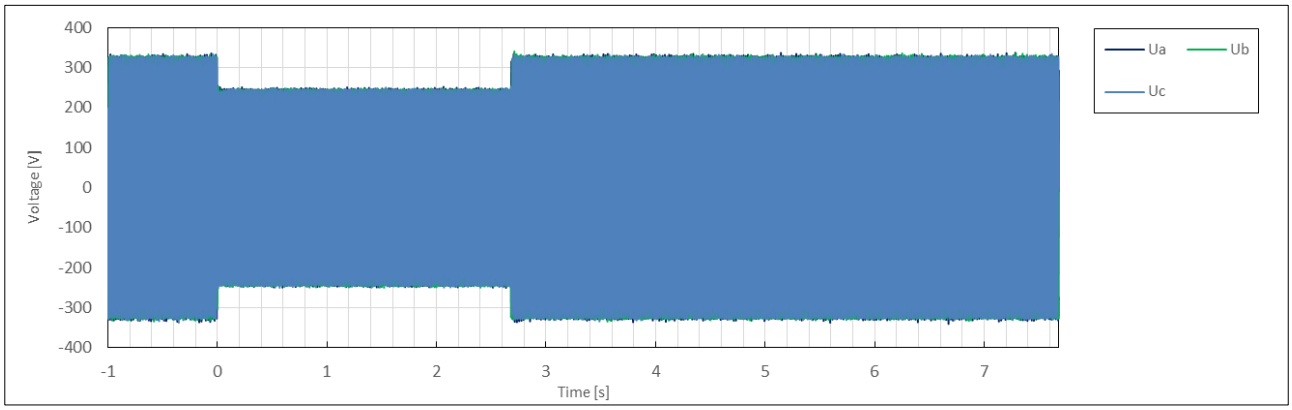
No. 4.9 Idle Test

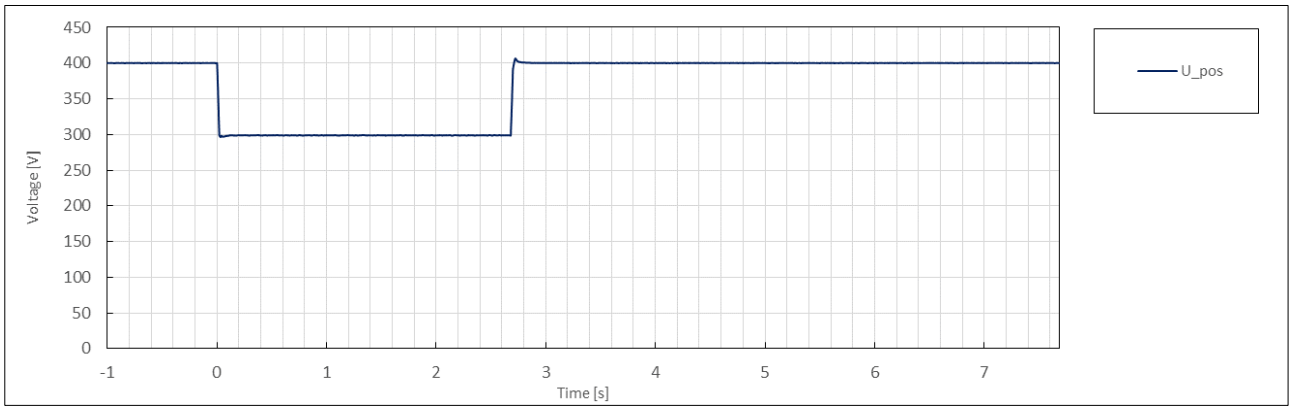


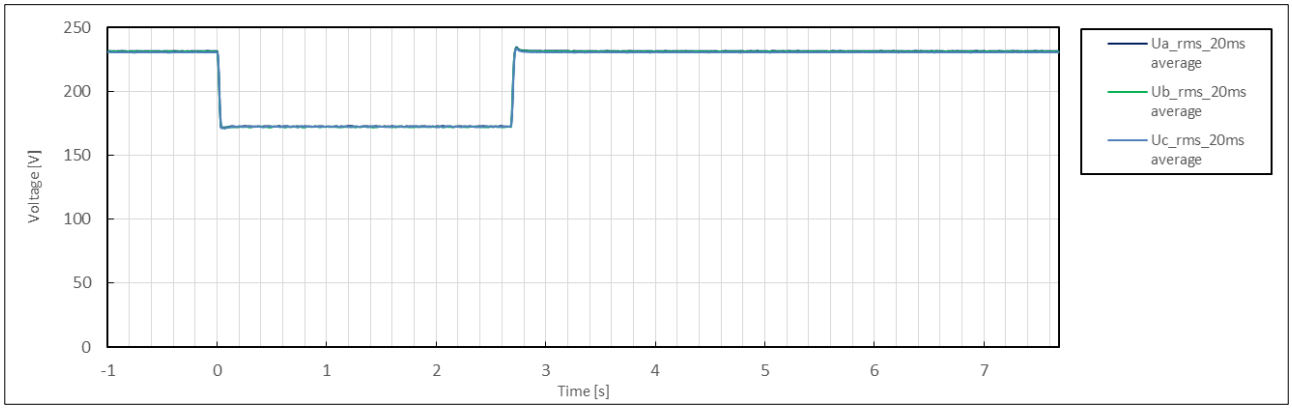


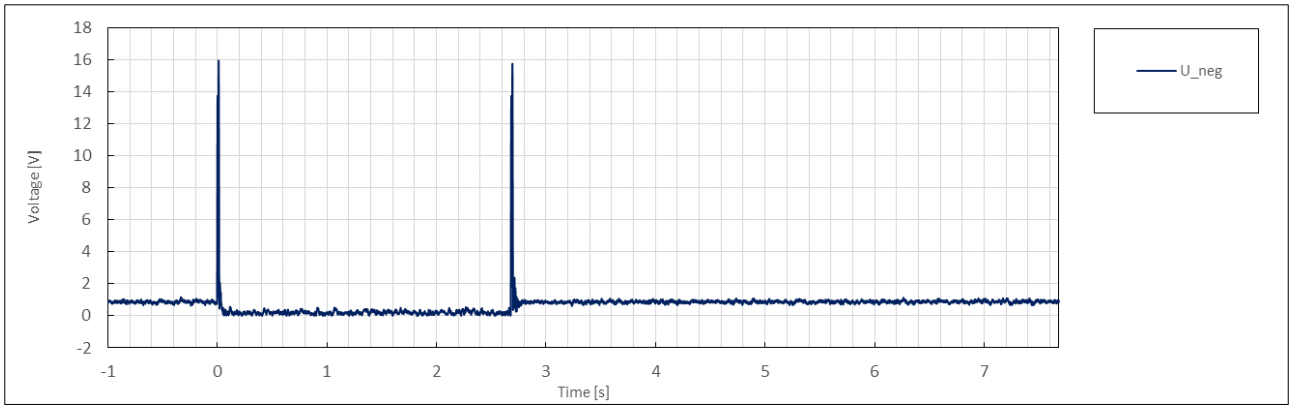


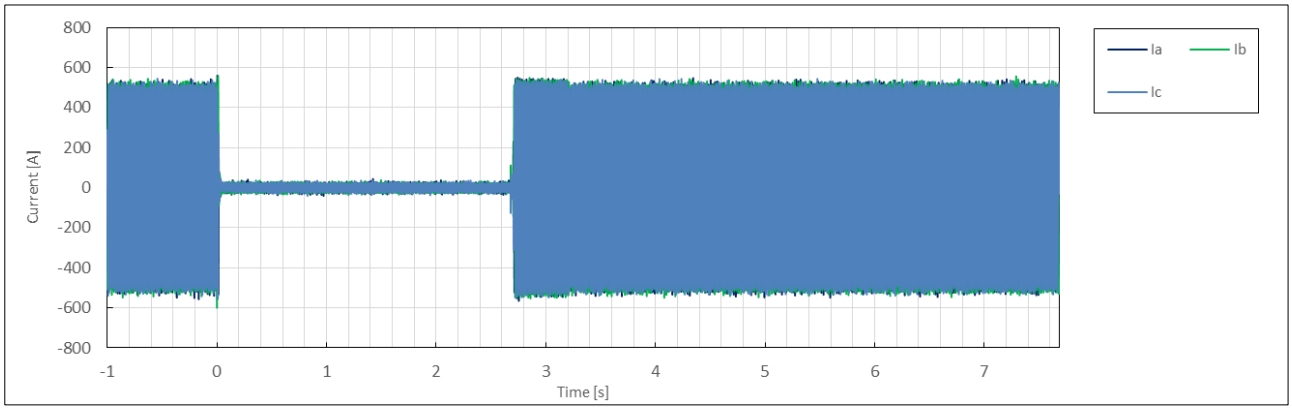
No. 4.9 Load Test

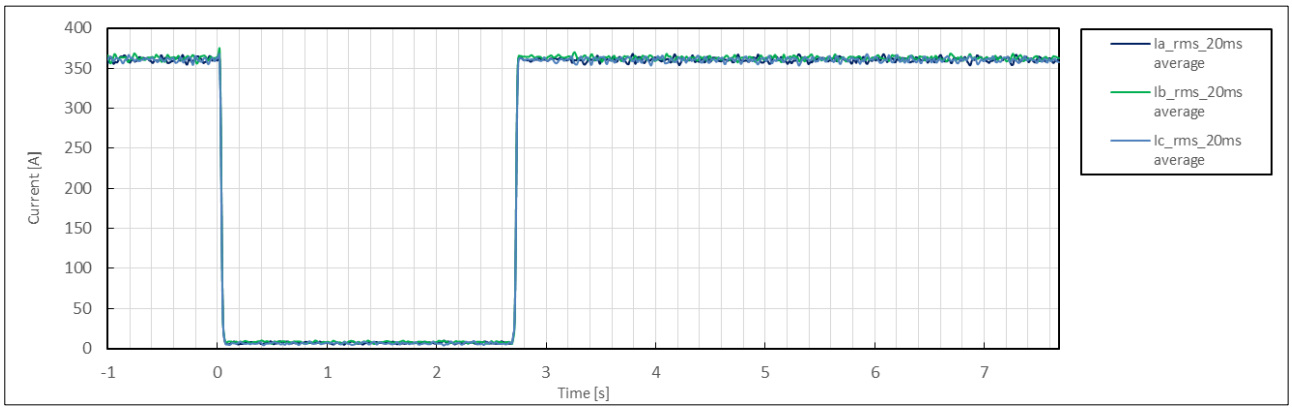


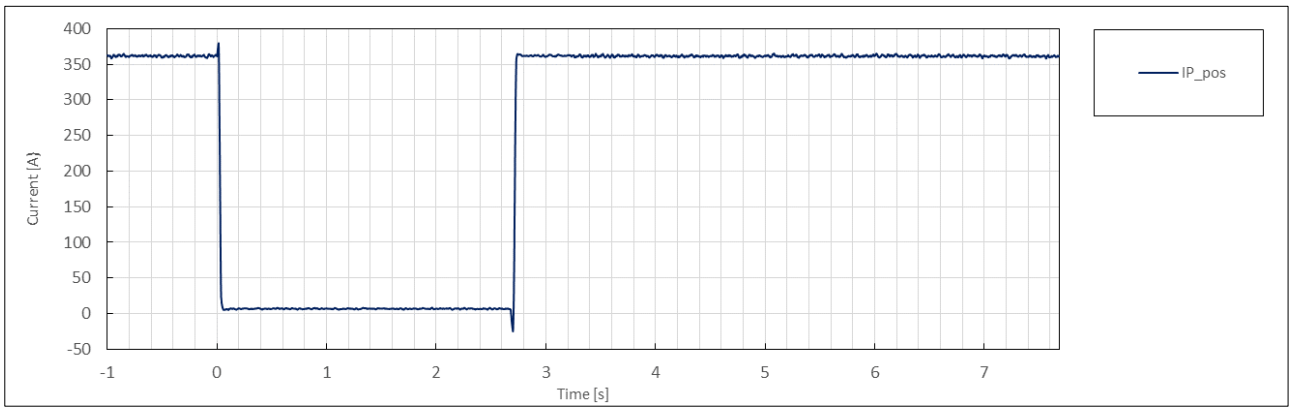


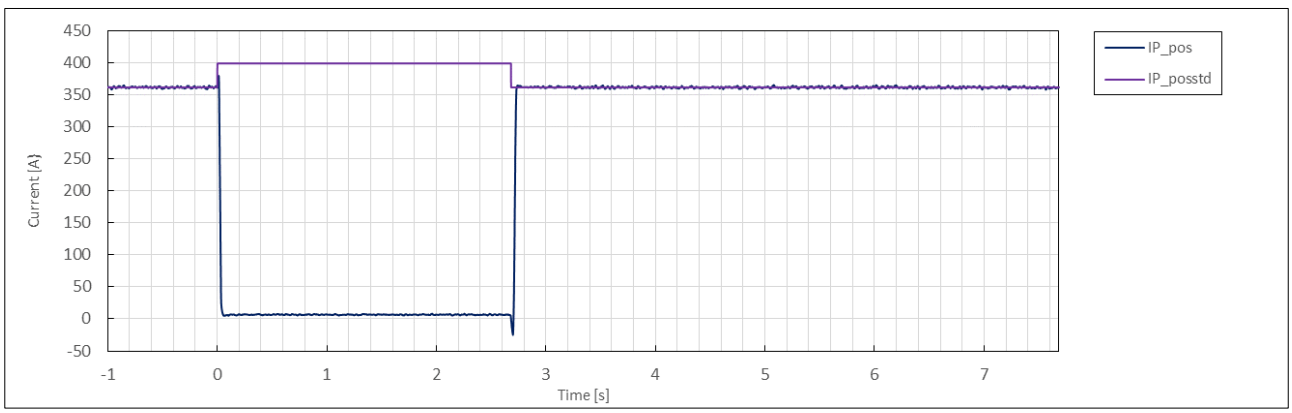


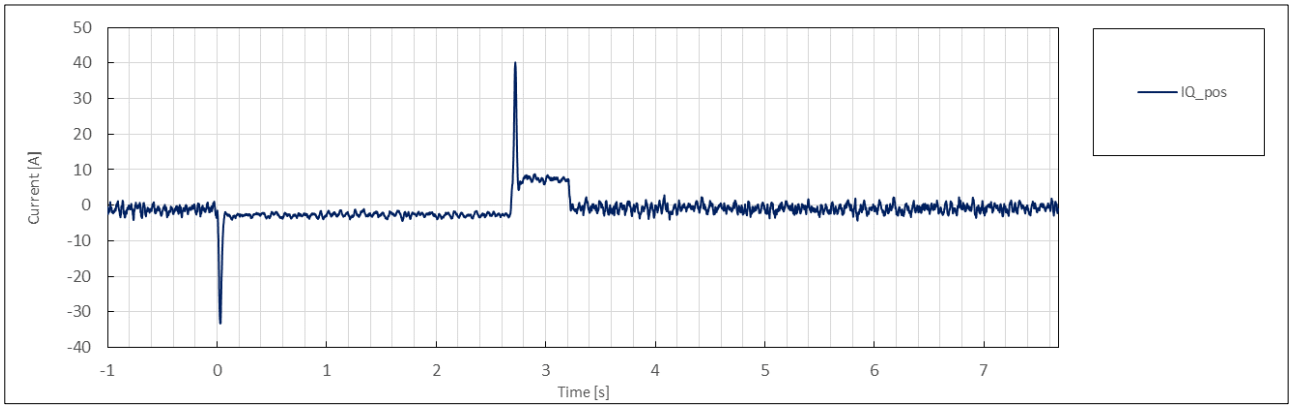


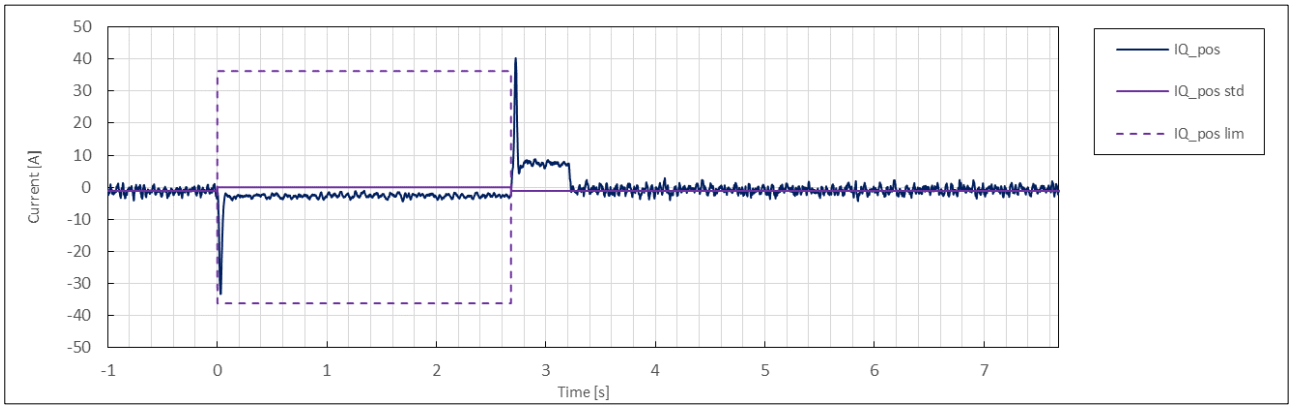

Current [A]
Time [s]
Ia
Ib
Ic

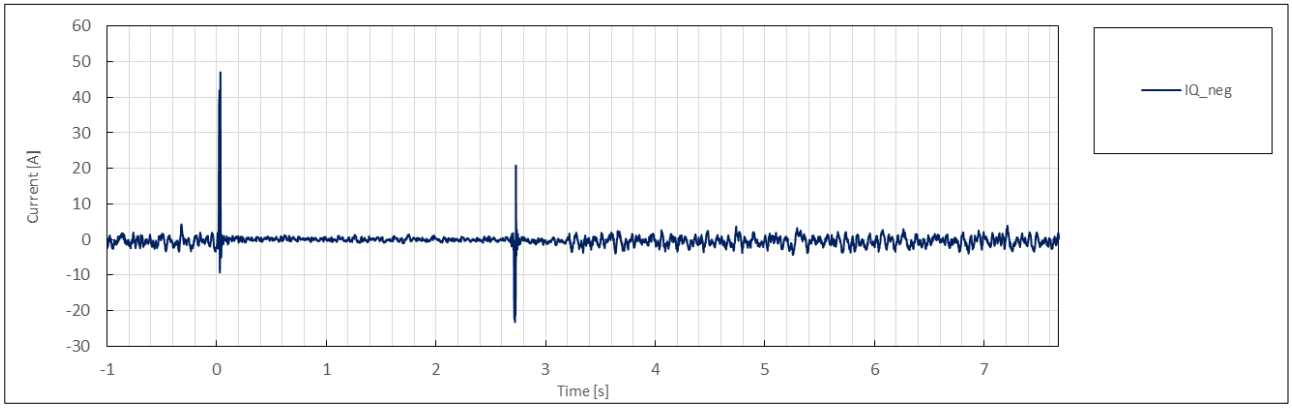

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

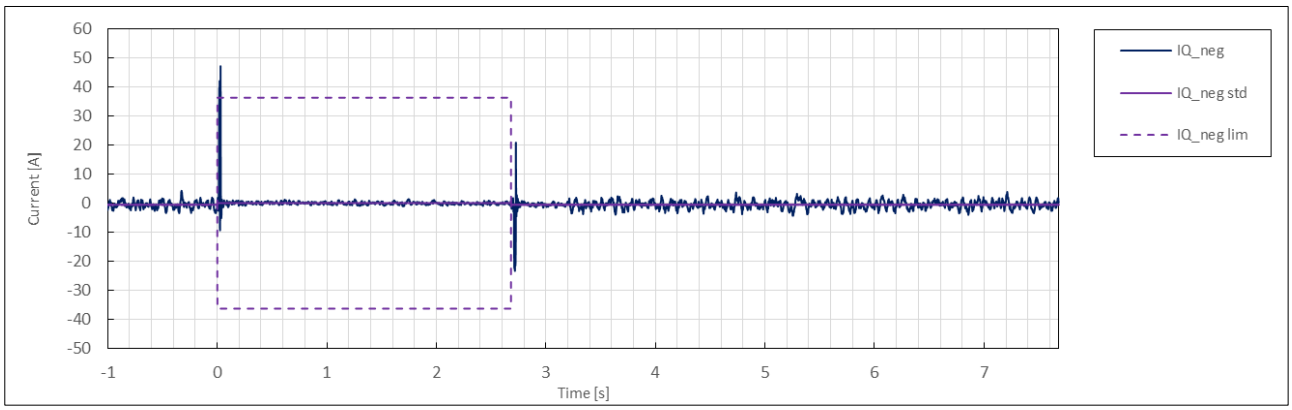

Current [A]
Time [s]
IP_pos

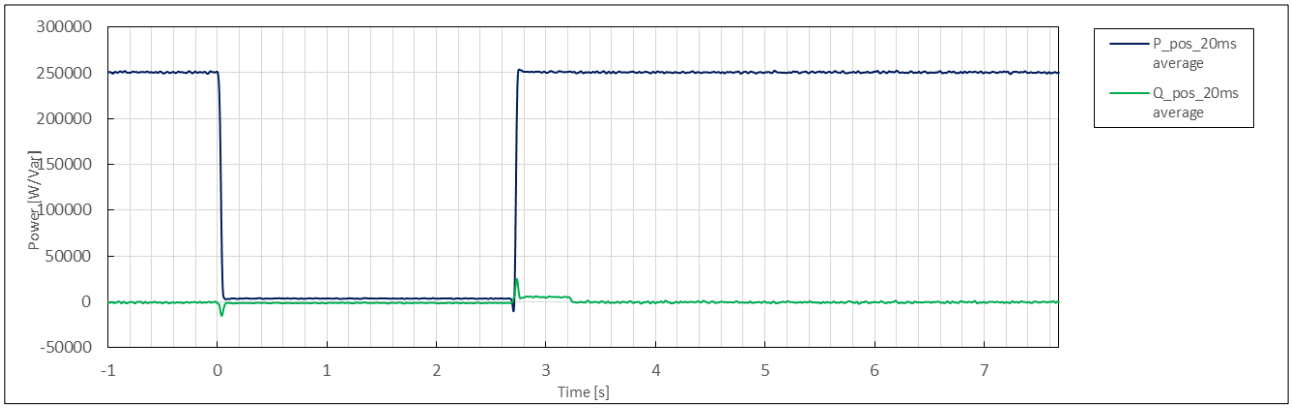

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

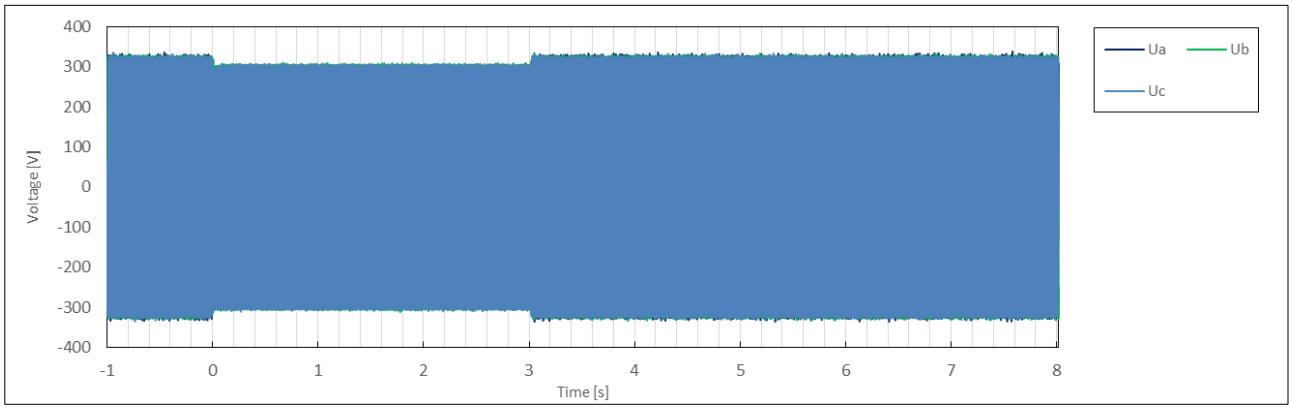

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

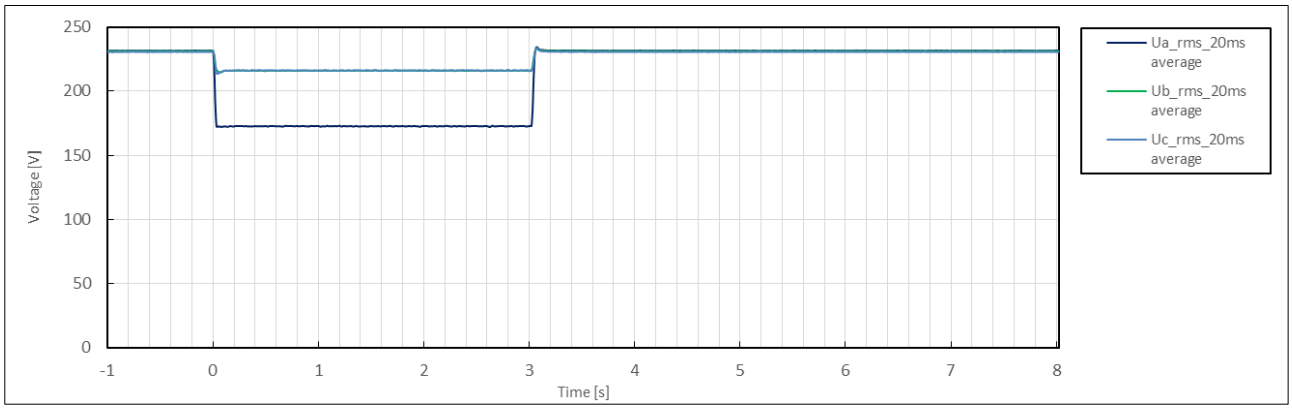

Current [A]
Time [s]
IQ_neg

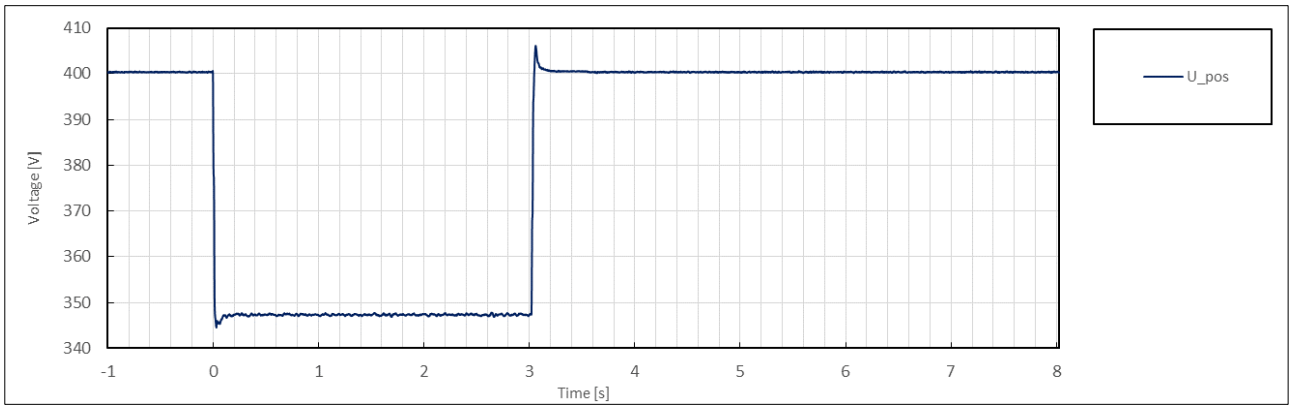

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
Time [s]
P_pos_20ms average
Q_pos_20ms average

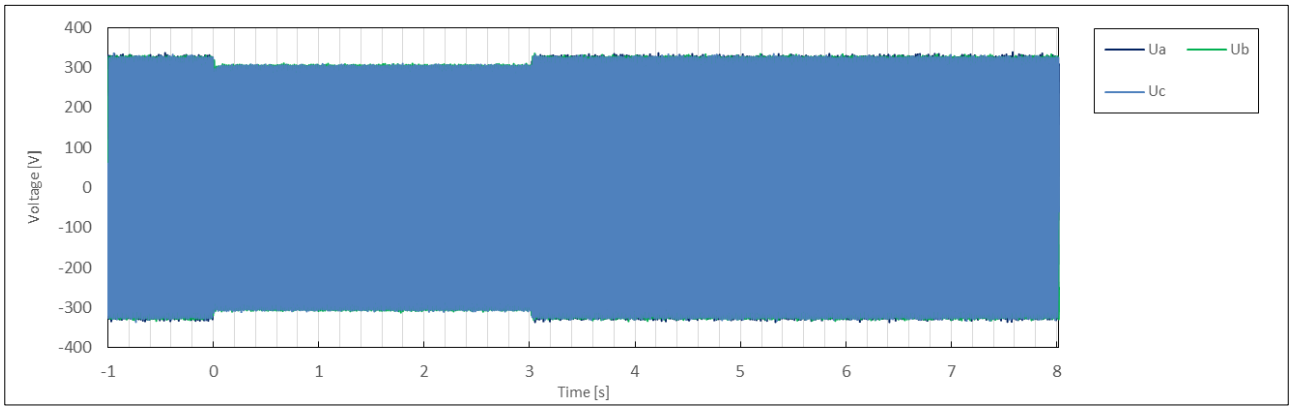
No. 4.10 Idle Test

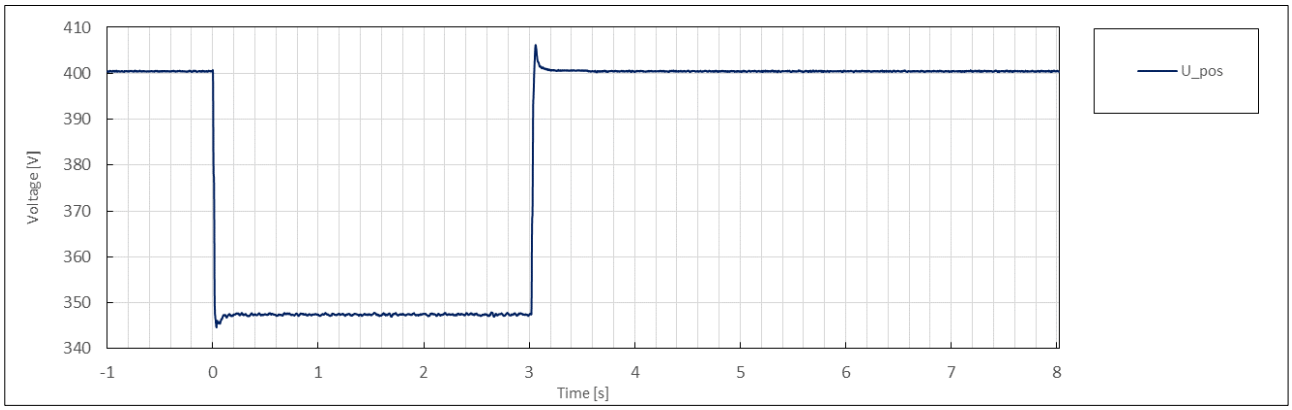


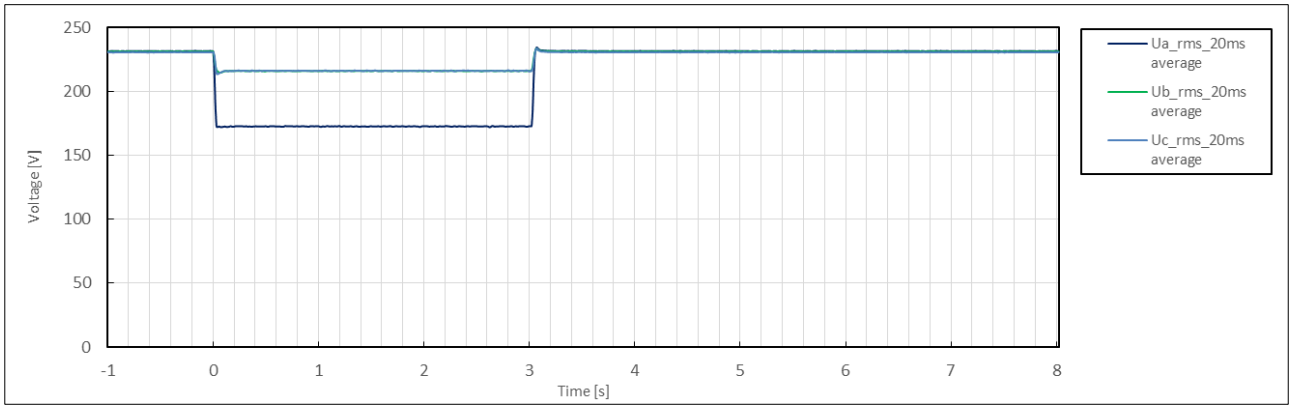


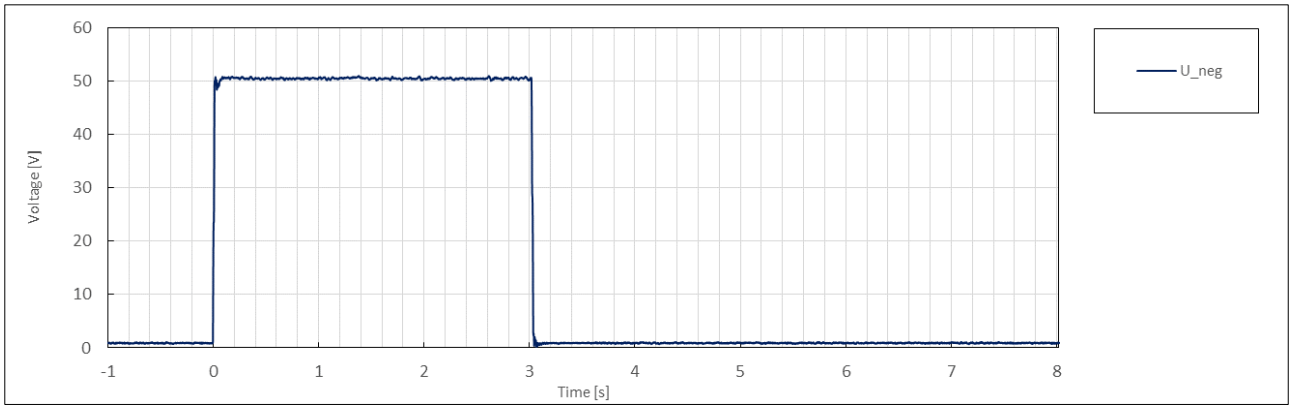


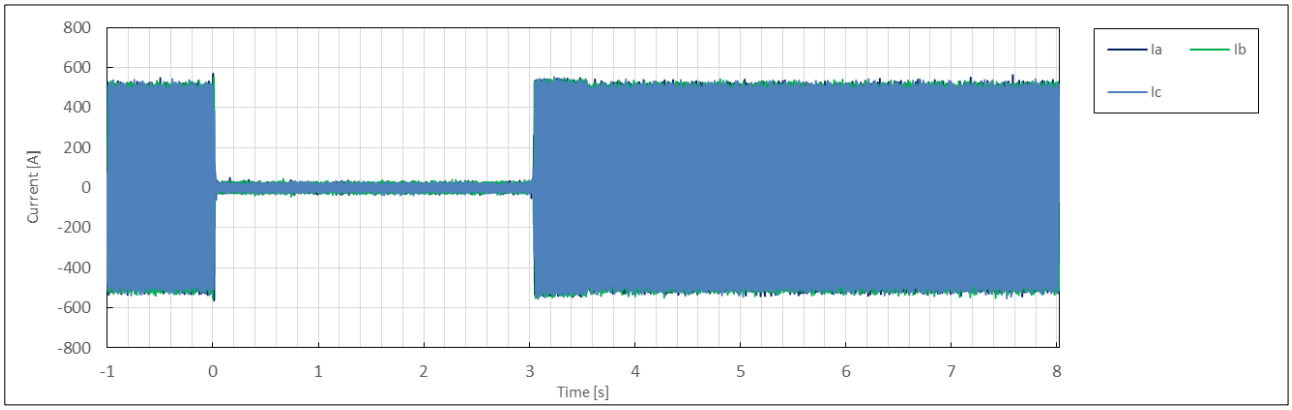
No. 4.10 Load Test

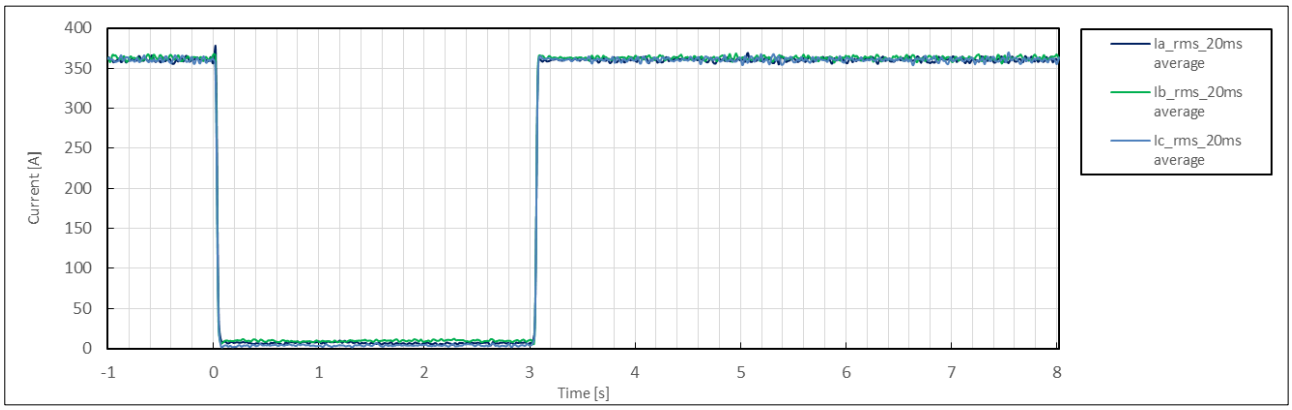


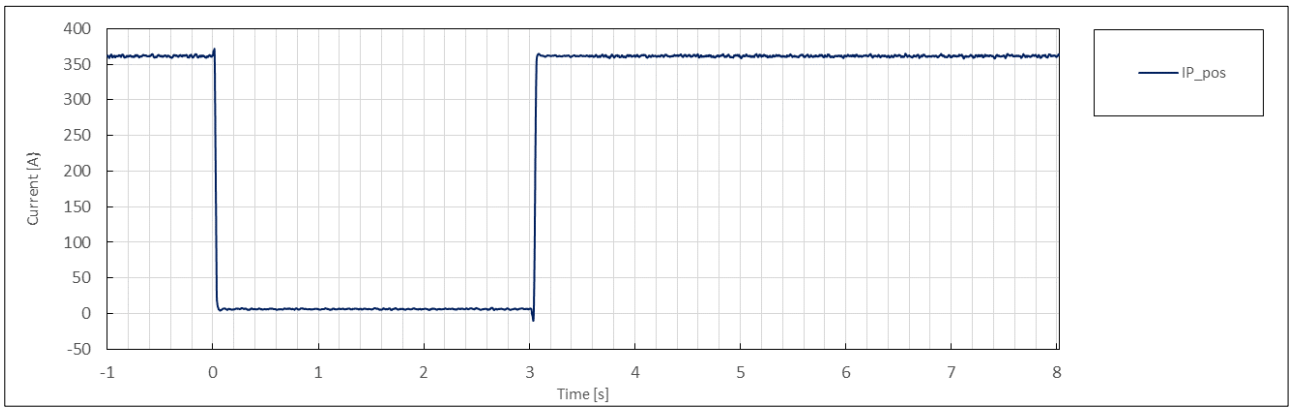


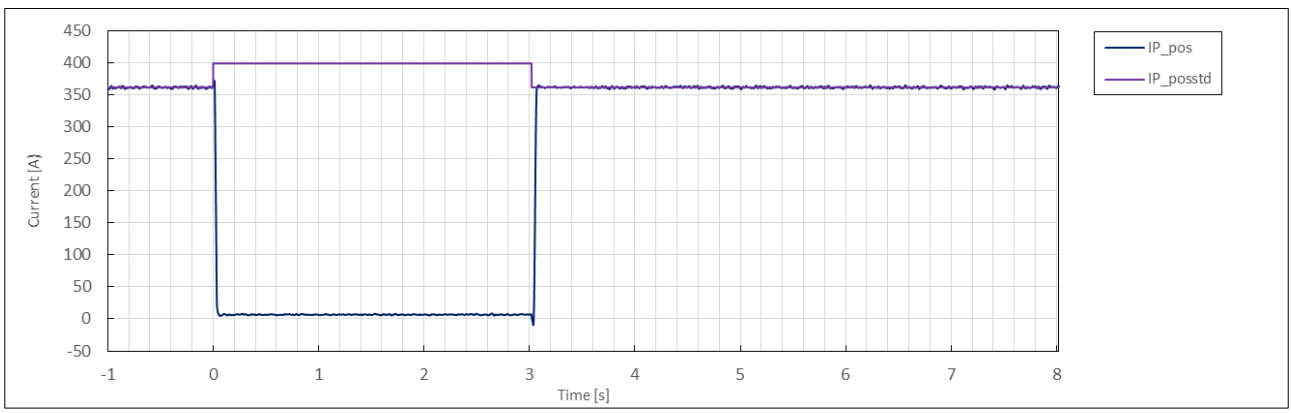


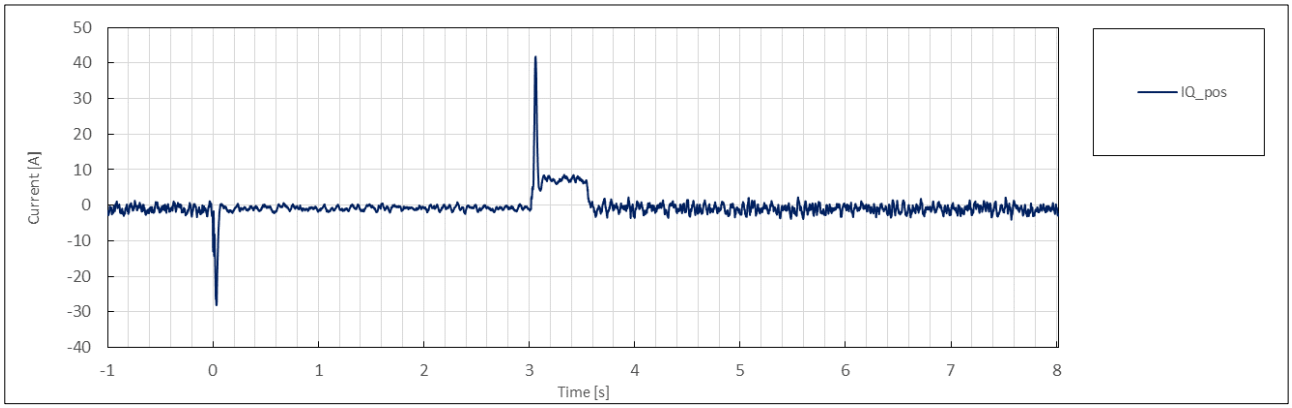


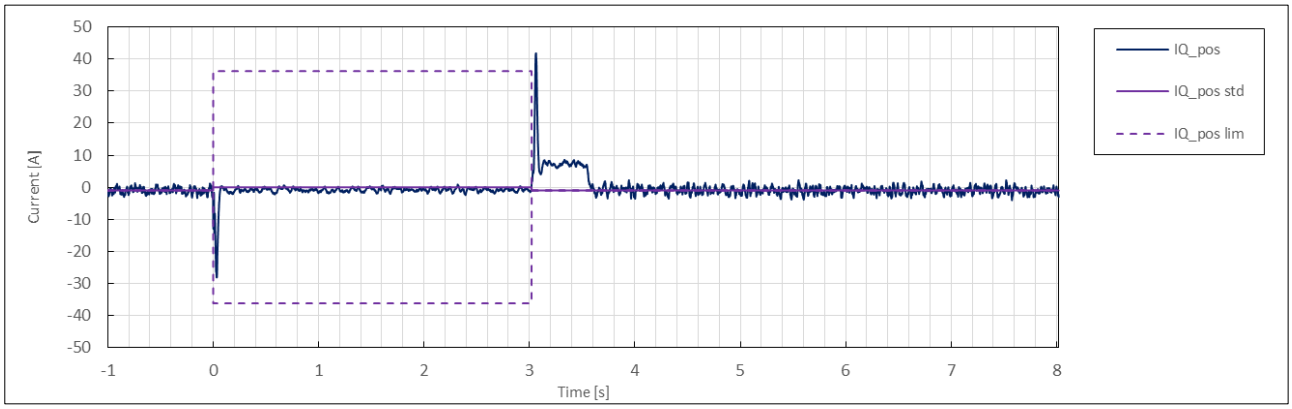

Current [A]
Time [s]
Ia
Ib
Ic

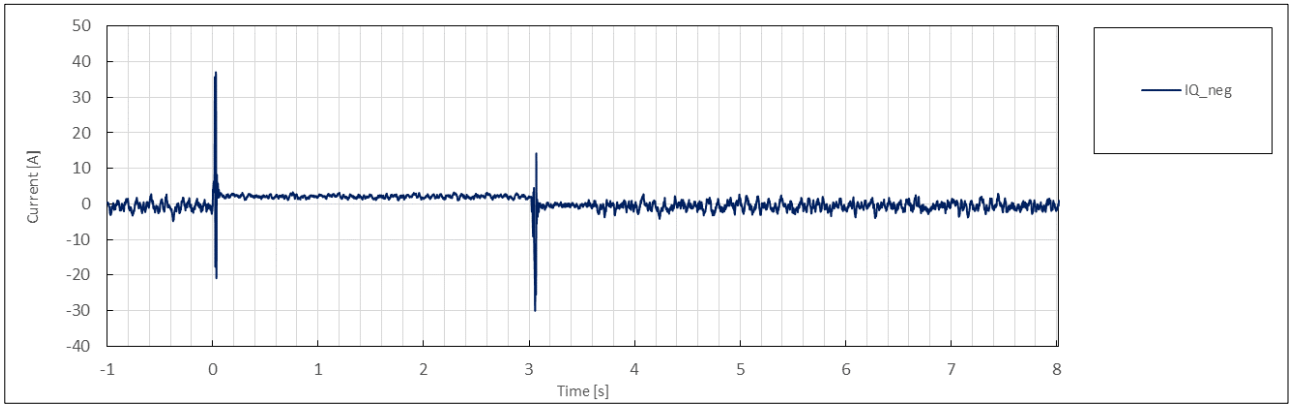

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

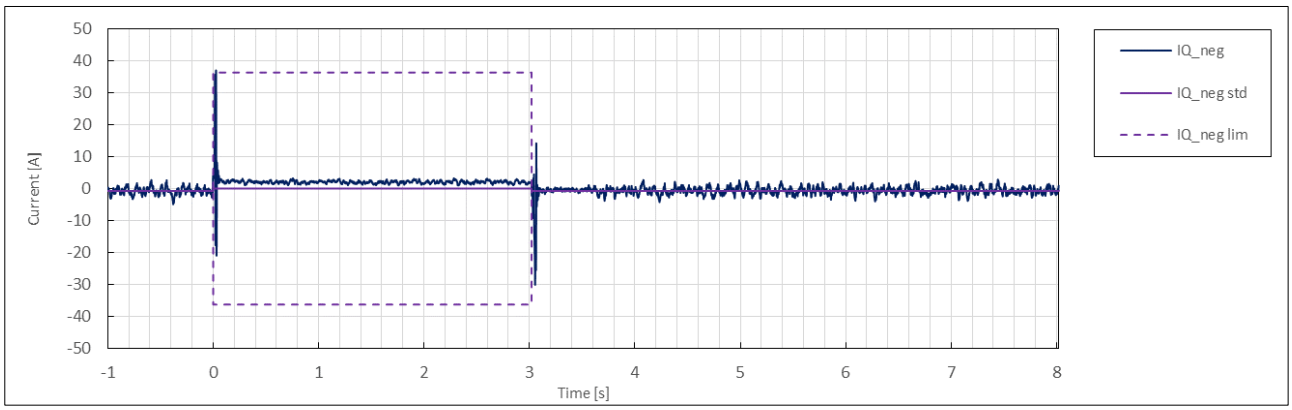

Current [A]
Time [s]
IP_pos

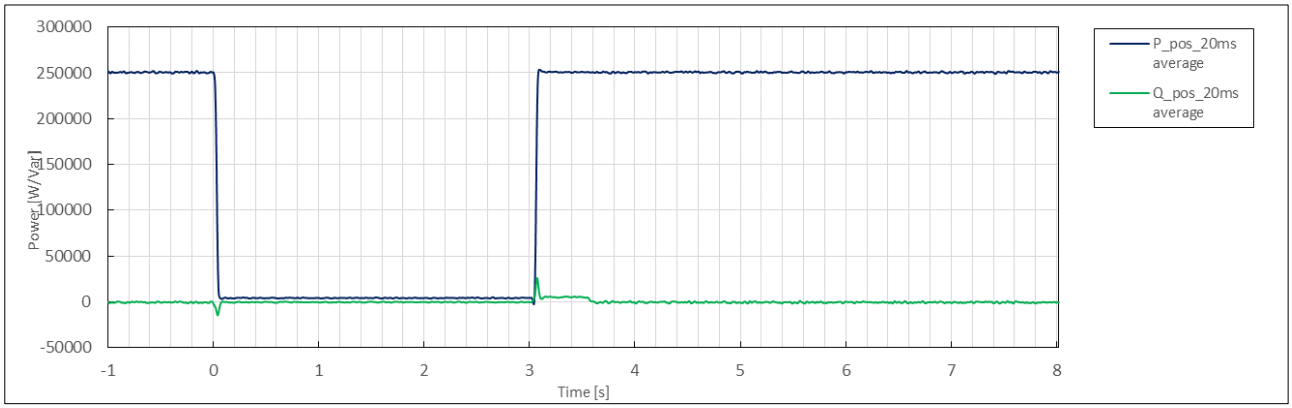

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

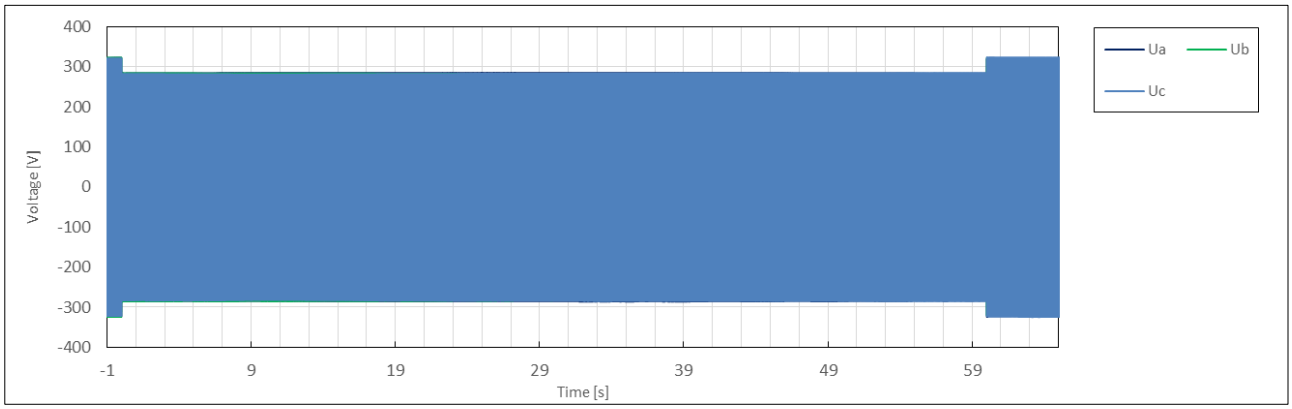

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

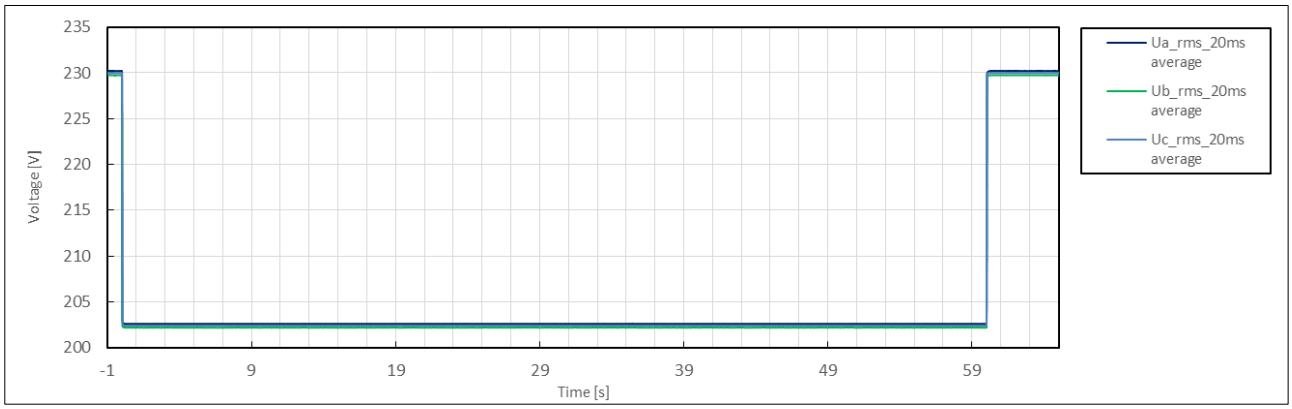

Current [A]
Time [s]
IQ_neg

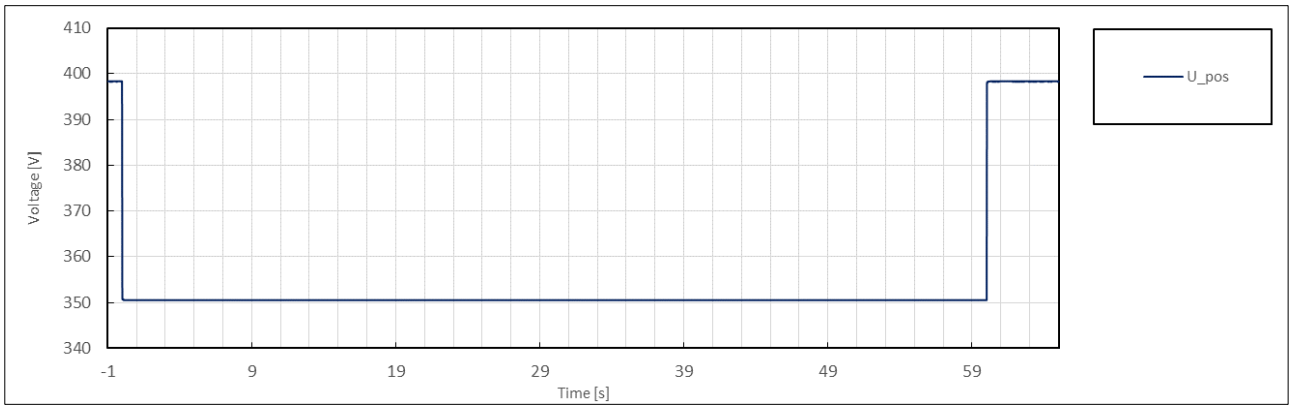

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
8
Time [s]
P_pos_20ms average
Q_pos_20ms average

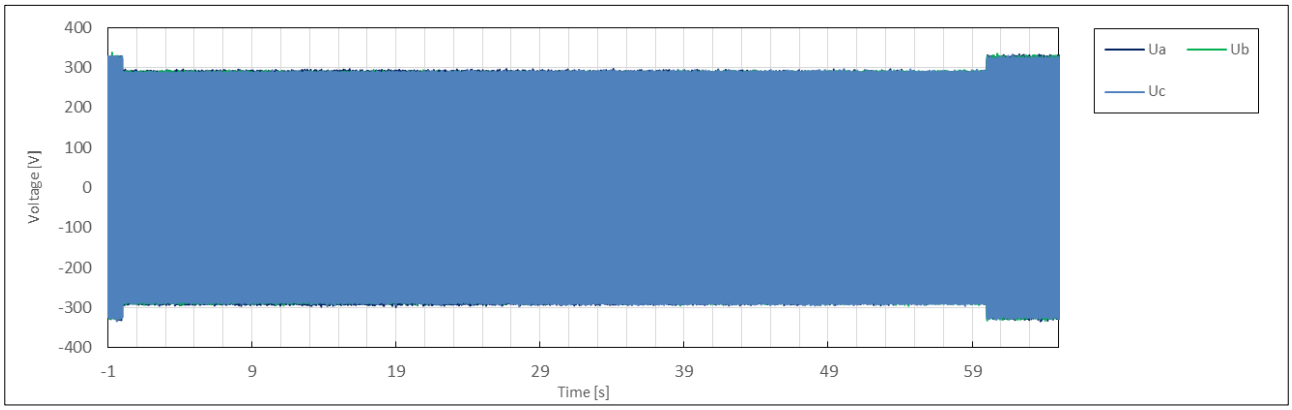
No. 5.1 Idle Test

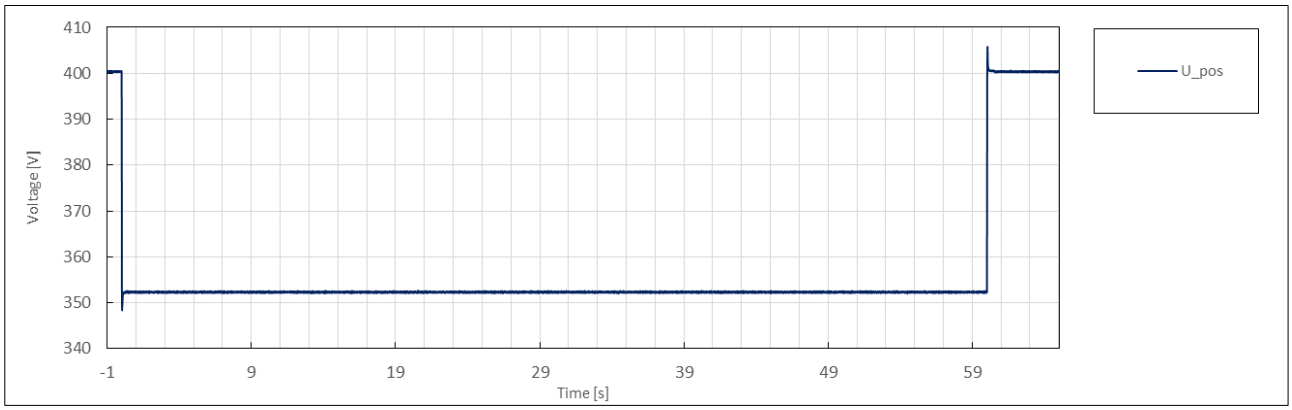


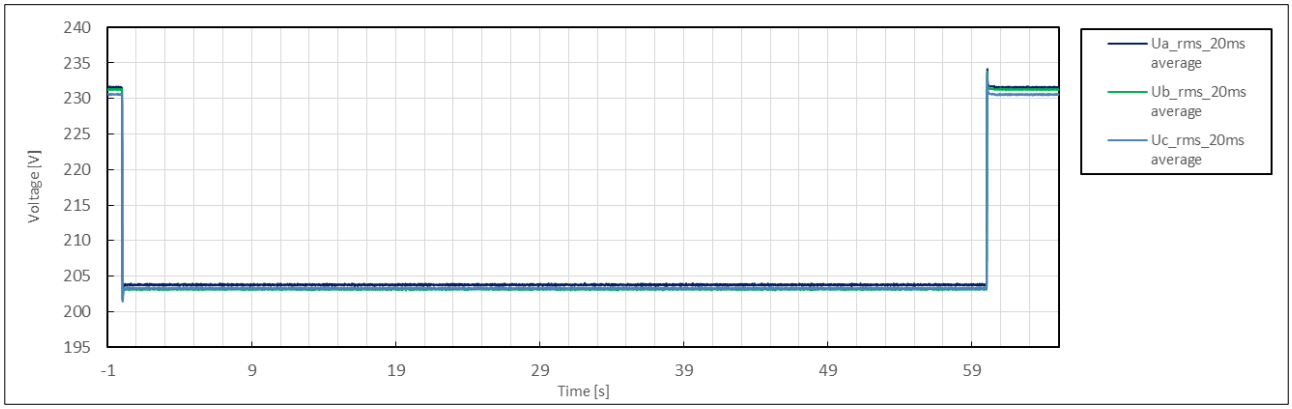


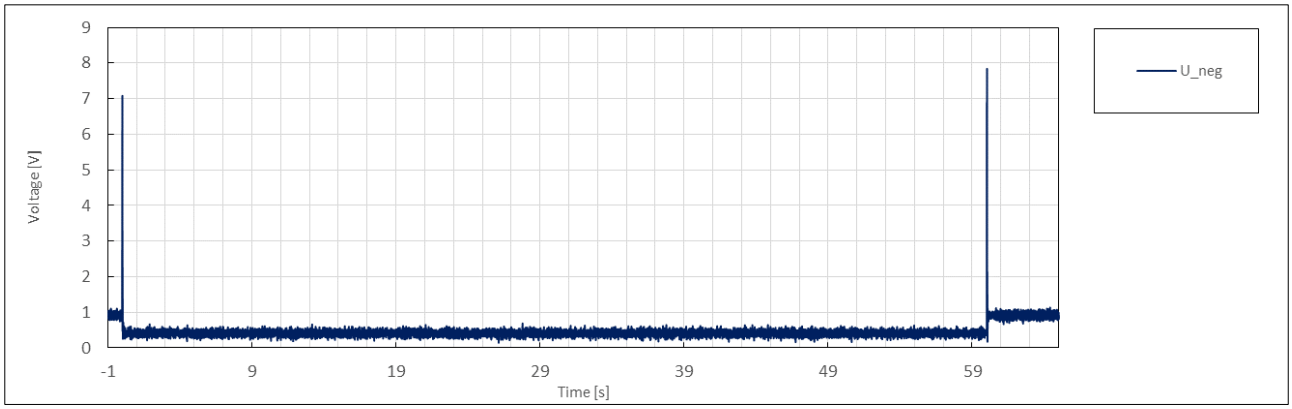


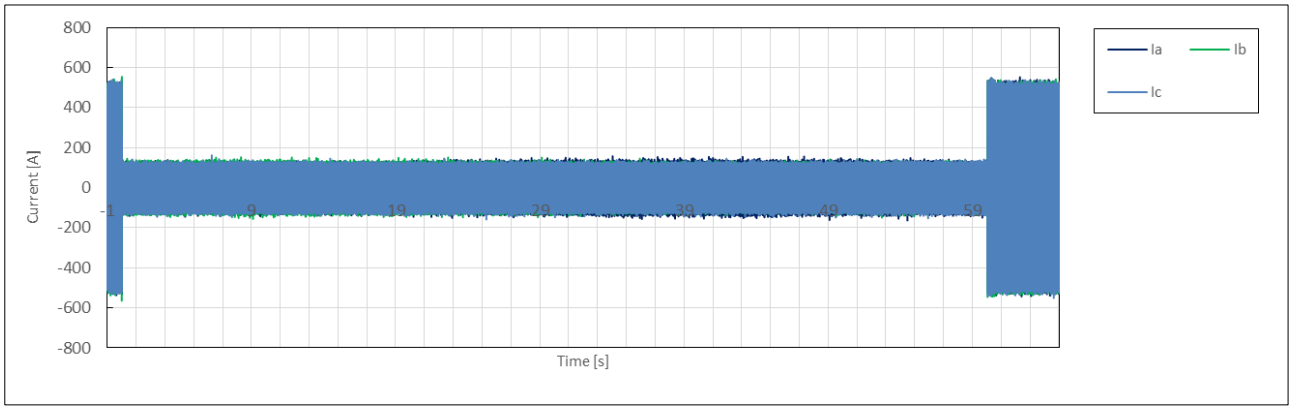
No. 5.1 Load Test

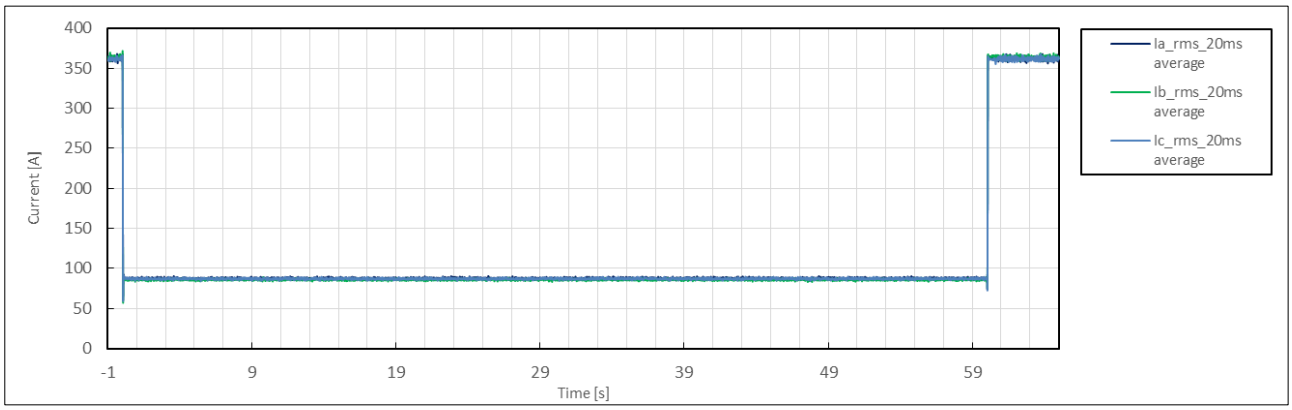


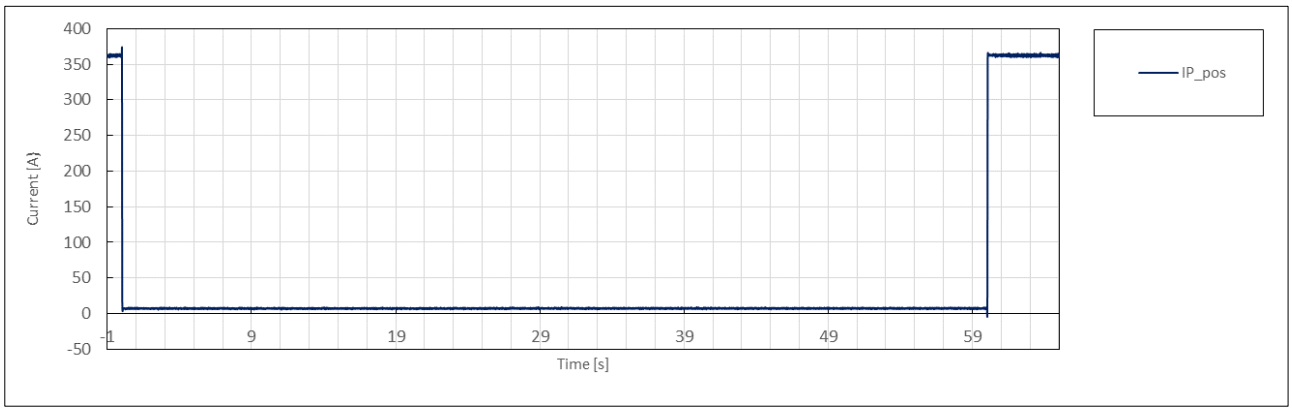


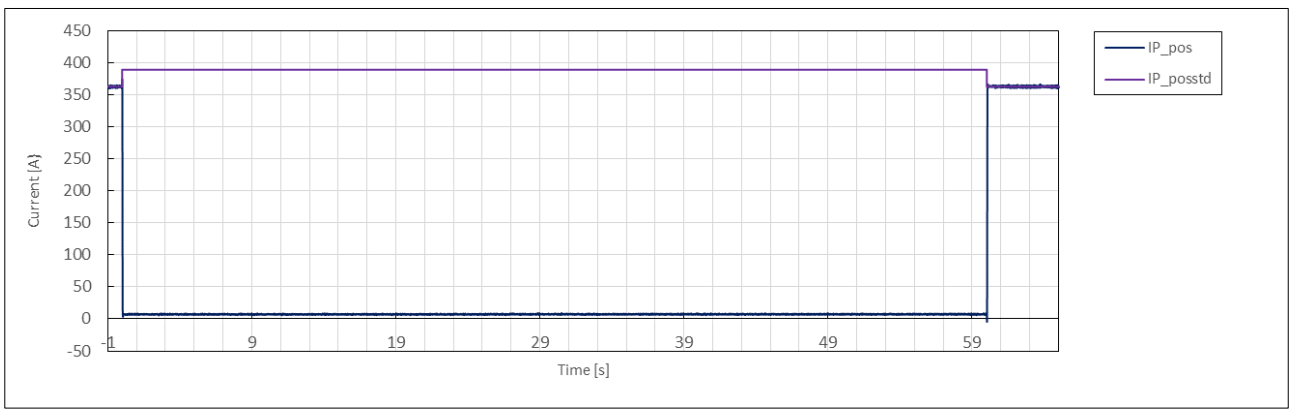


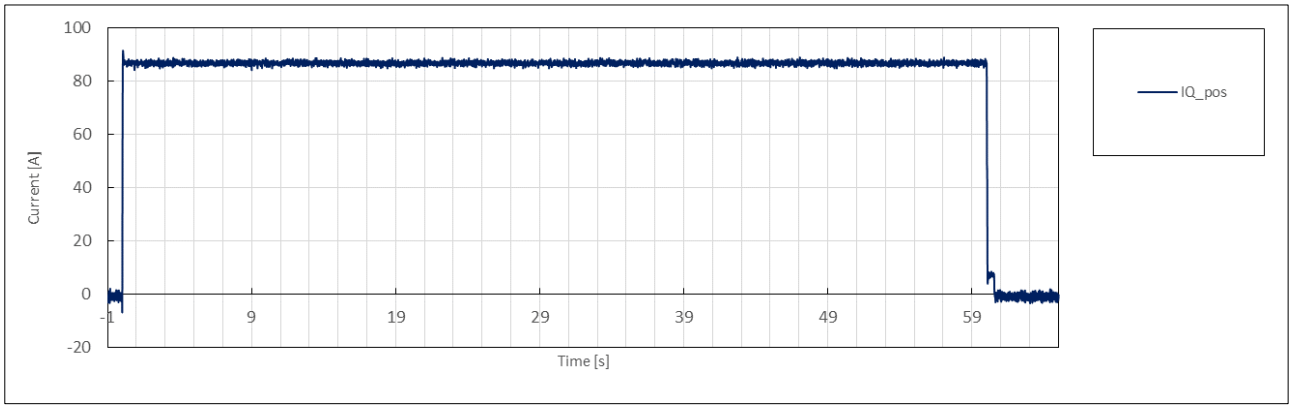


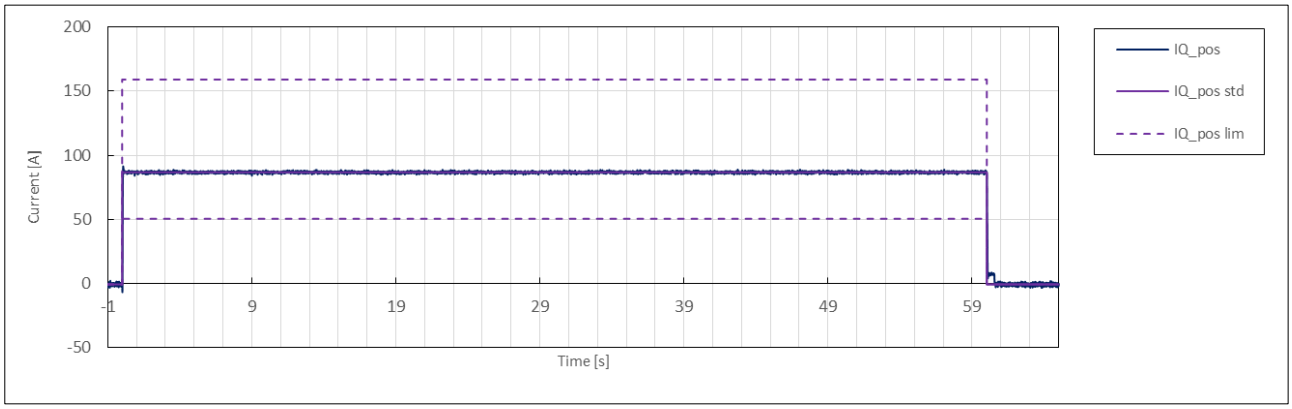

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
9
19
29
39
49
59
Time [s]
Ia
Ib
Ic

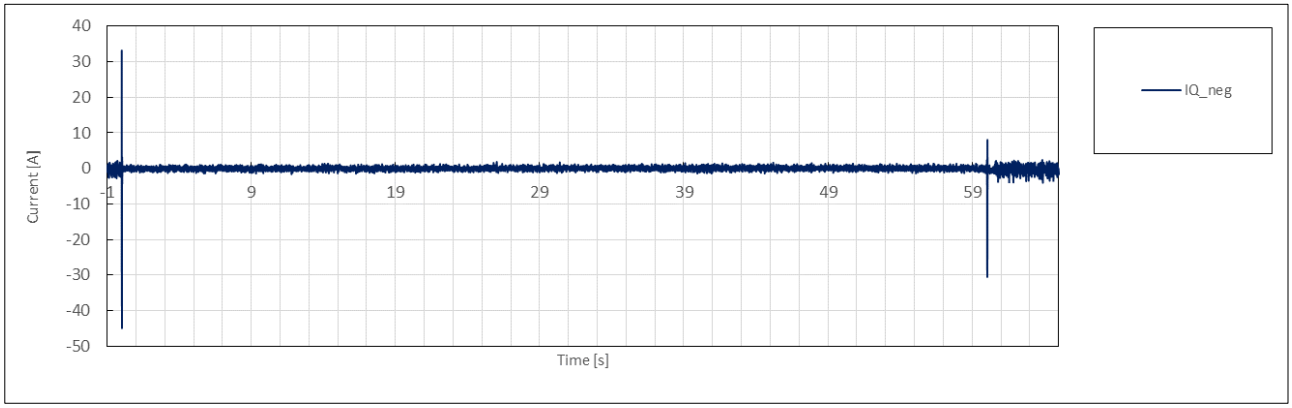

400
350
300
250
200
150
100
50
0
Current [A]
-1
9
19
29
39
49
59
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

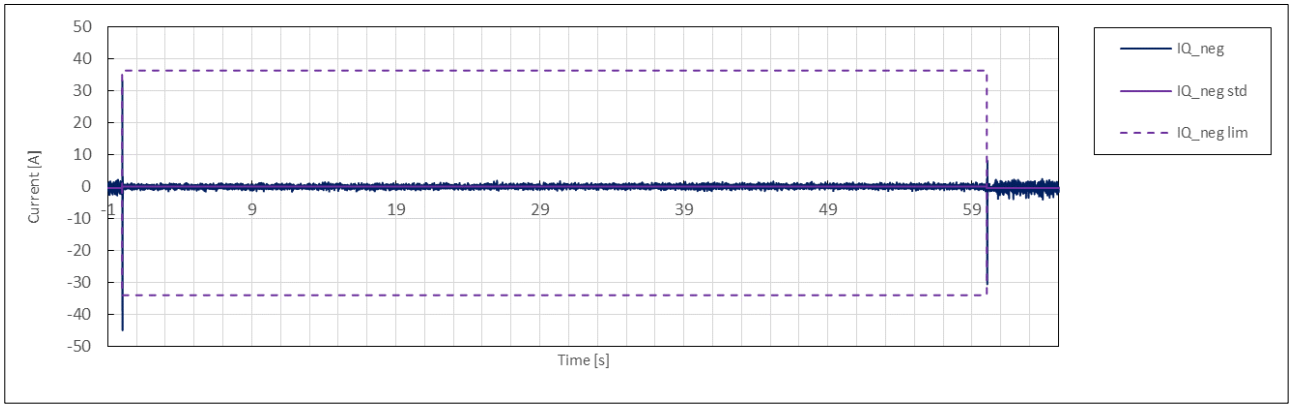

400
350
300
250
200
150
100
50
0
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IP_pos

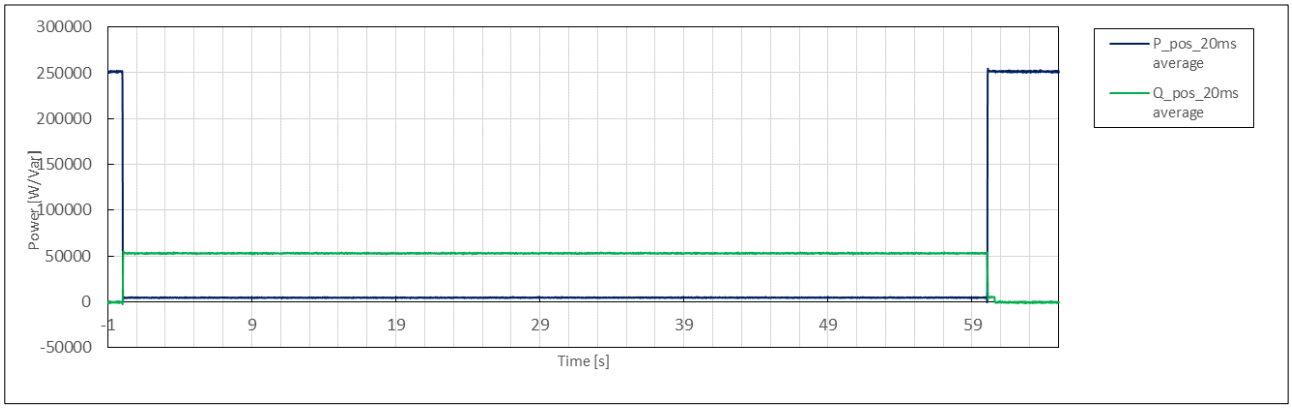

450
400
350
300
250
200
150
100
50
0
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IP_pos
IP_posstd


100
80
60
40
20
0
-20
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos

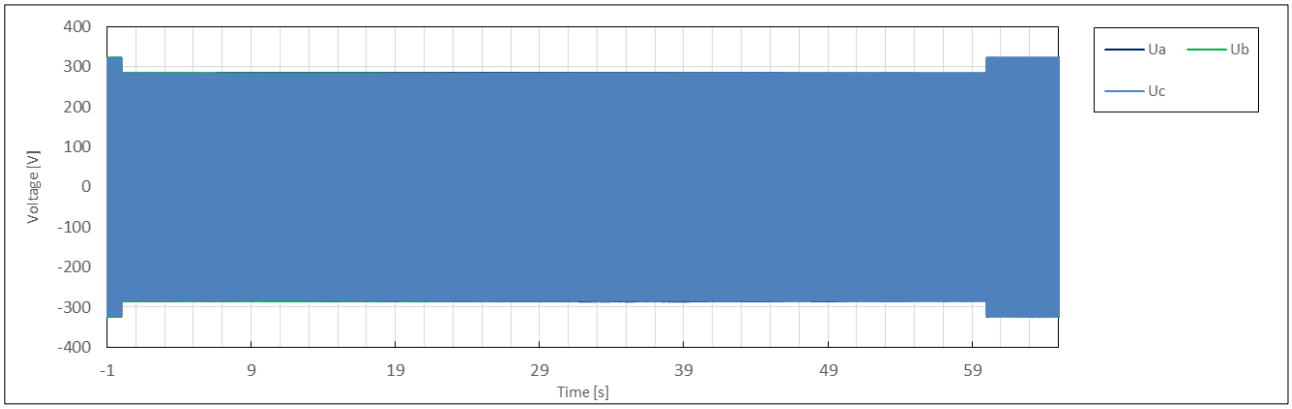

200
150
100
50
0
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

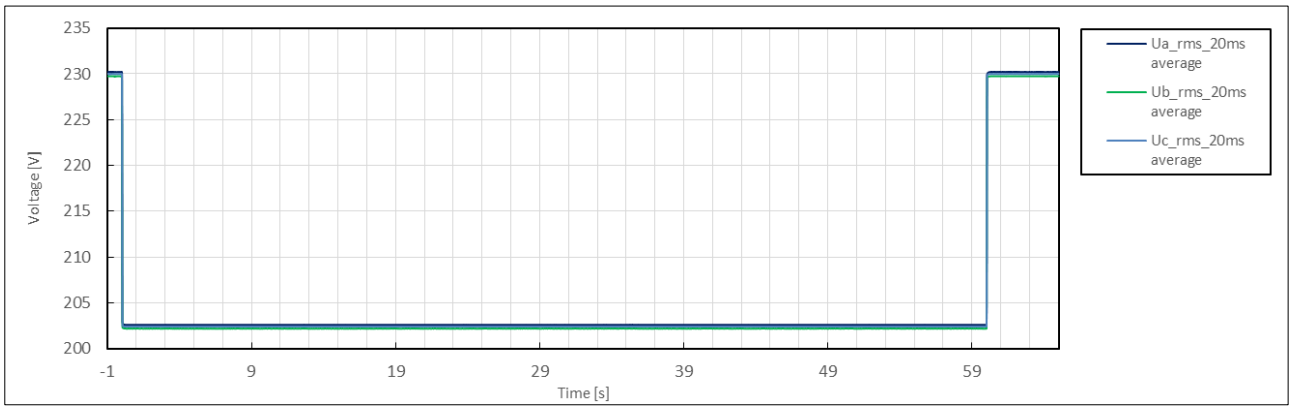

40
30
20
10
0
-10
-20
-30
-40
-50
Current [A]
-1
9
19
29
39
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59
Time [s]
IQ_neg

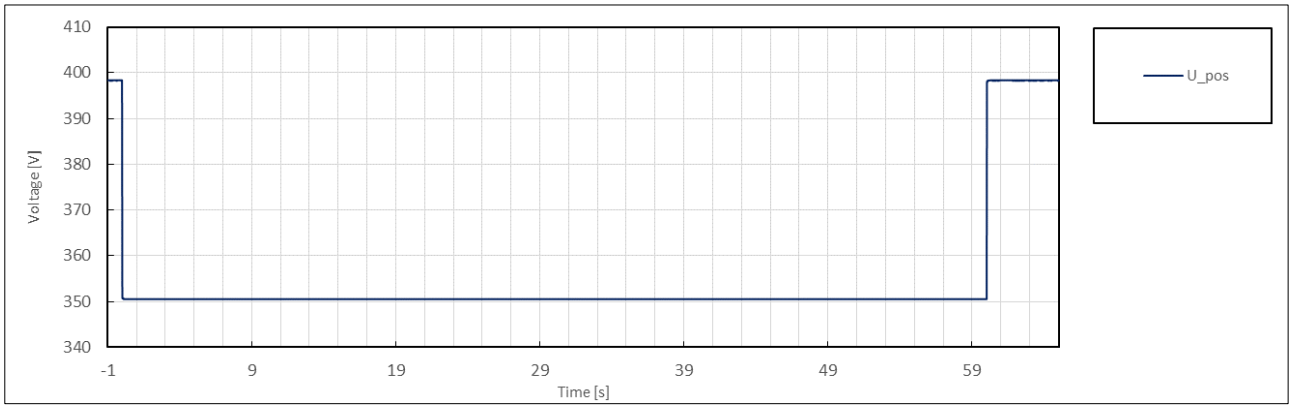

50
40
30
20
10
0
-10
-20
-30
-40
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim



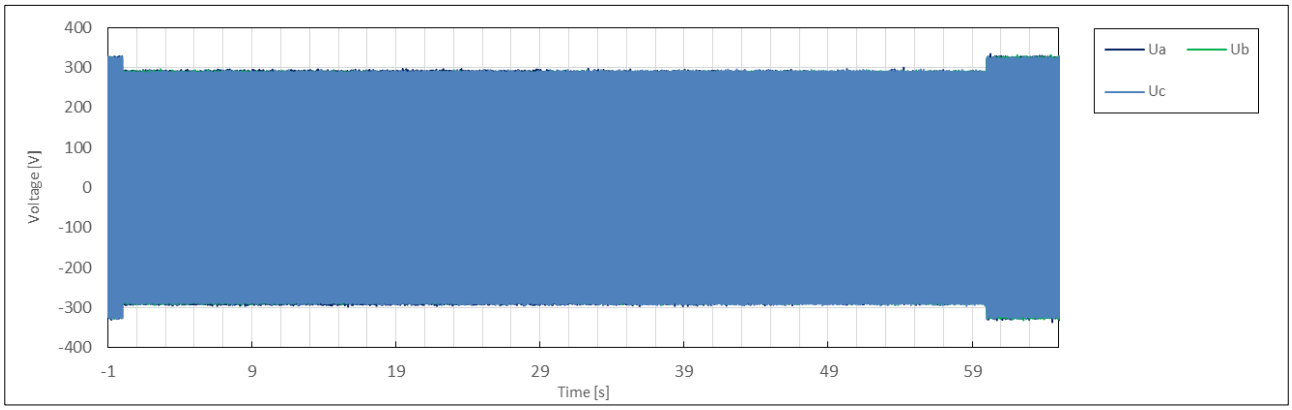
No. 5.2 Idle Test

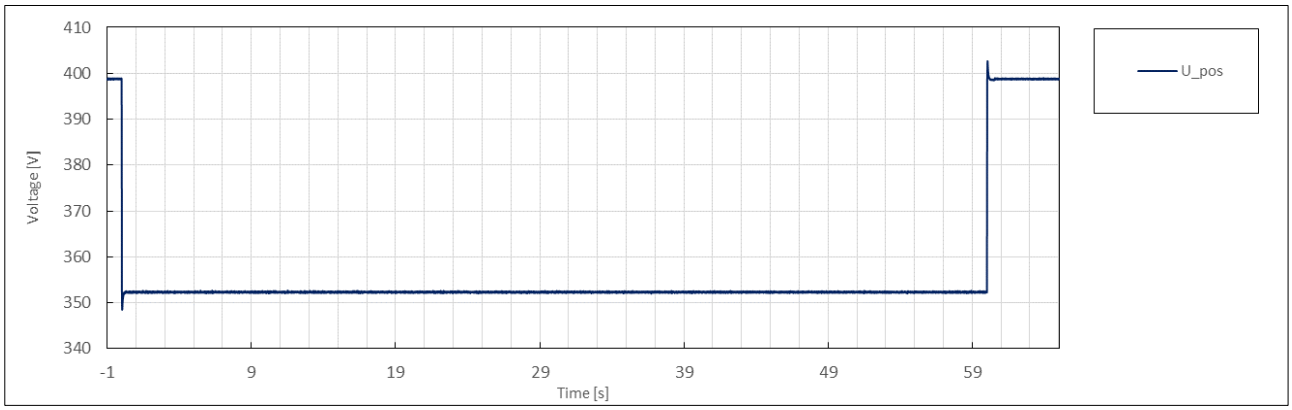


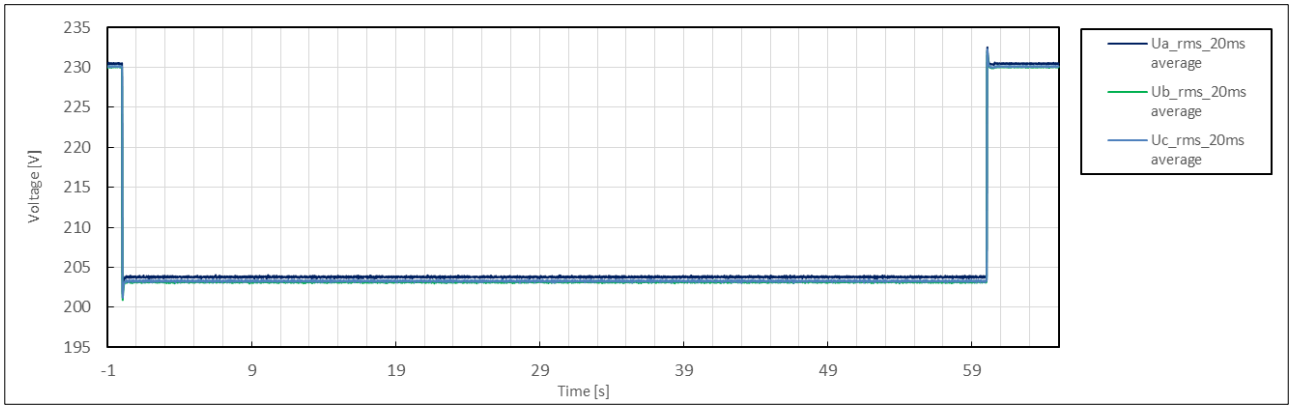


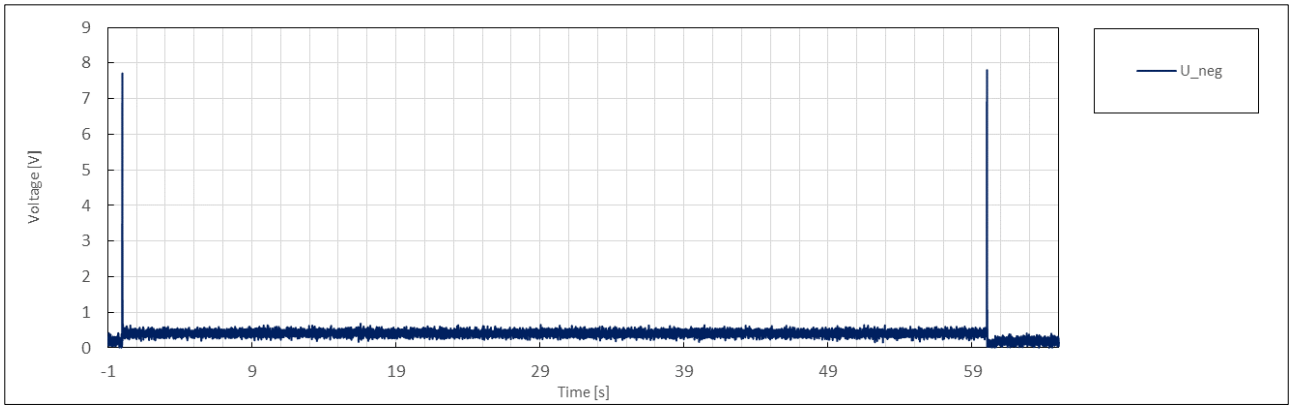

410
400
390
380
370
360
350
340
Voltage [V]
-1
9
19
29
39
49
59
Time [s]
U_pos

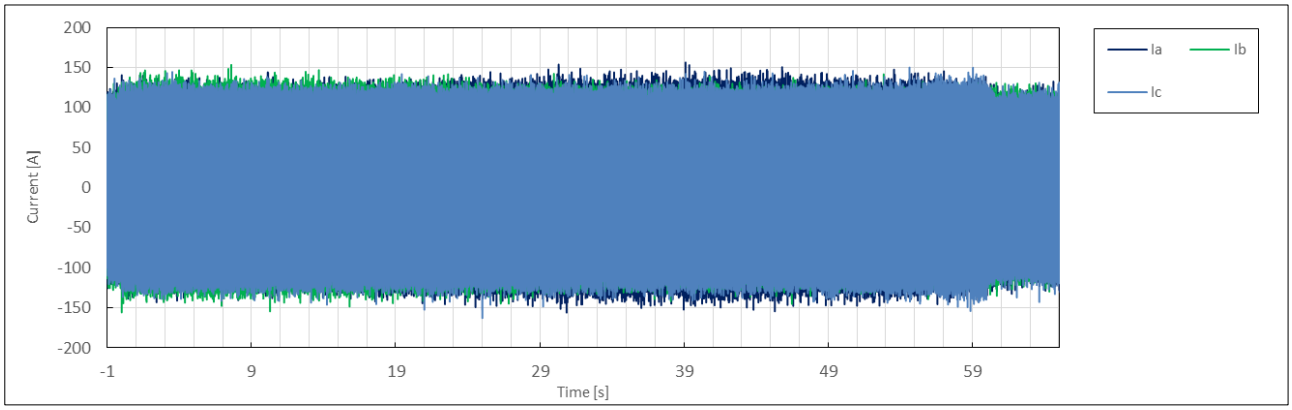
No. 5.2 Load Test

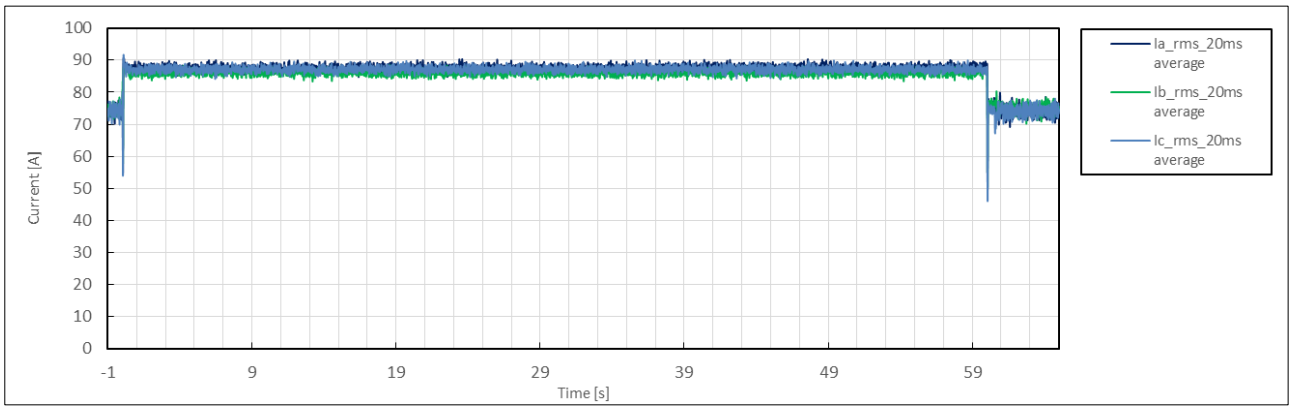


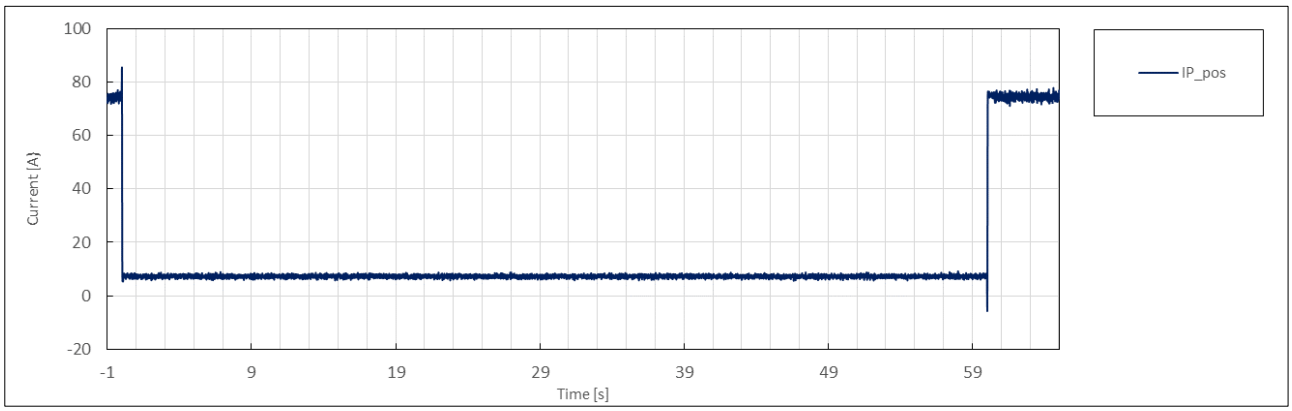


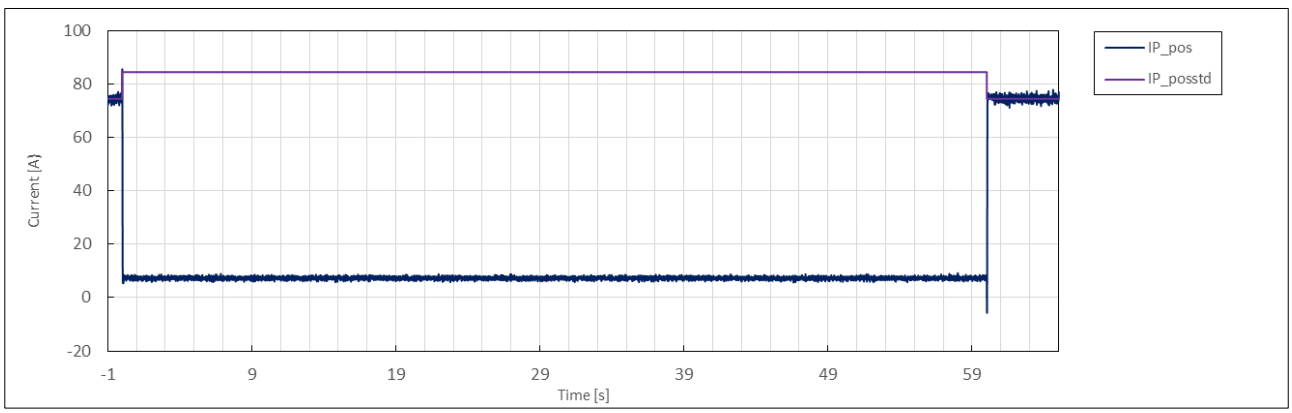


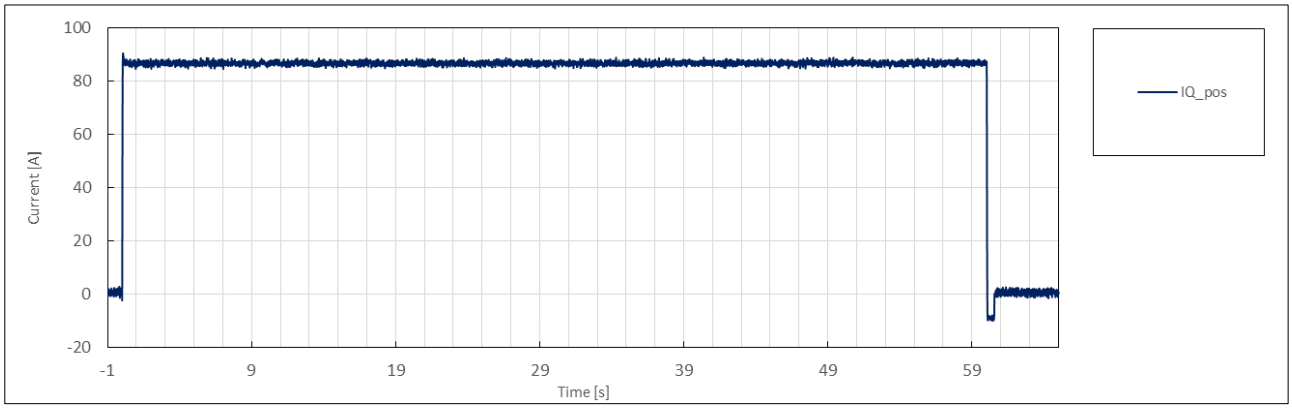


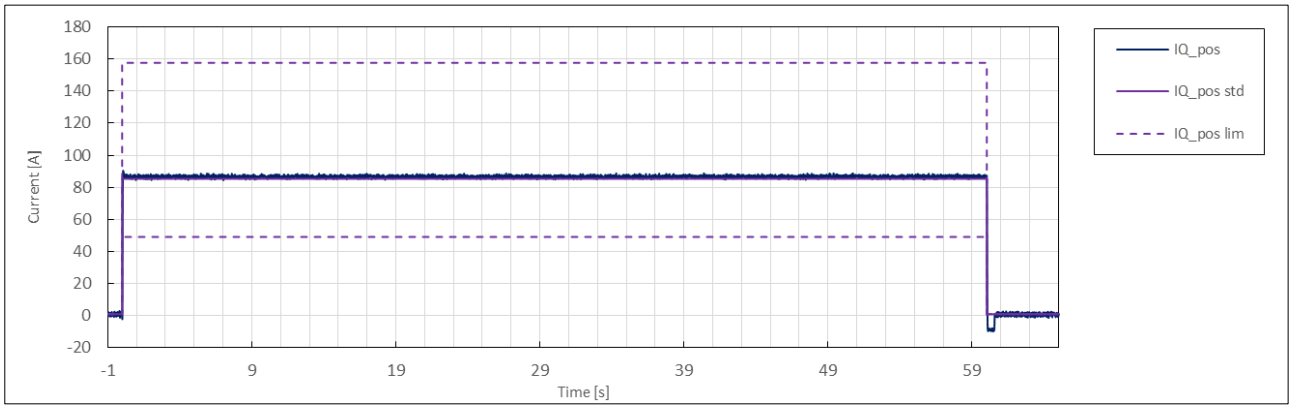

Current [A]
Time [s]
Ia
Ib
Ic

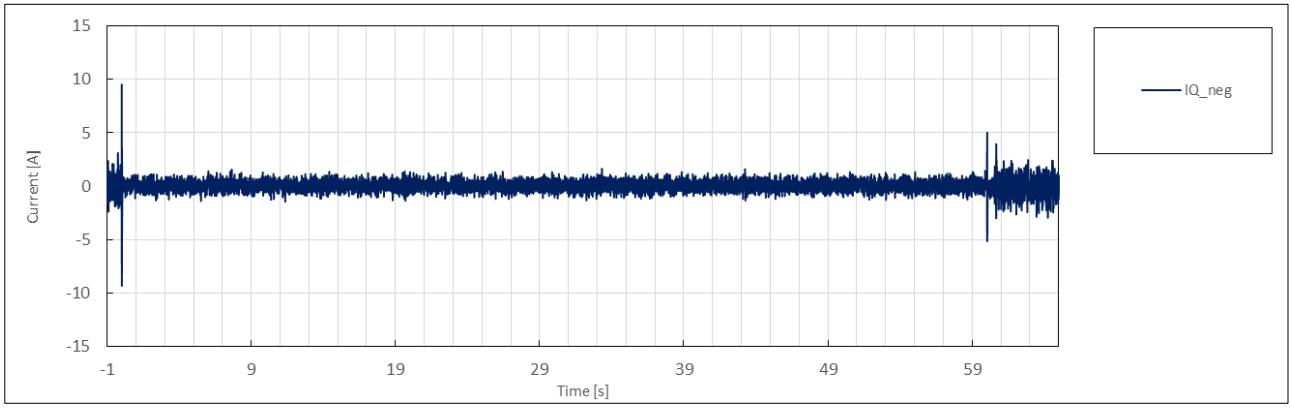

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

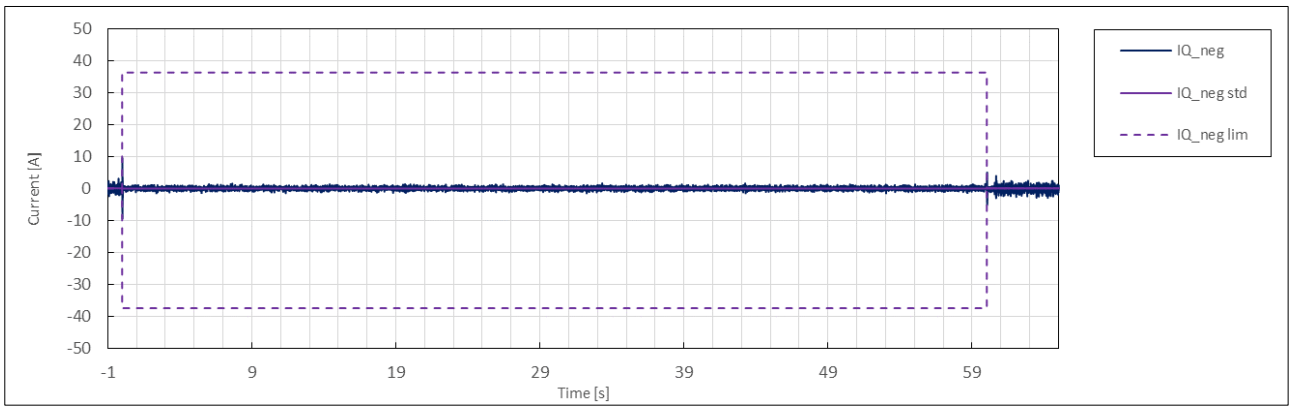

Current [A]
Time [s]
IP_pos

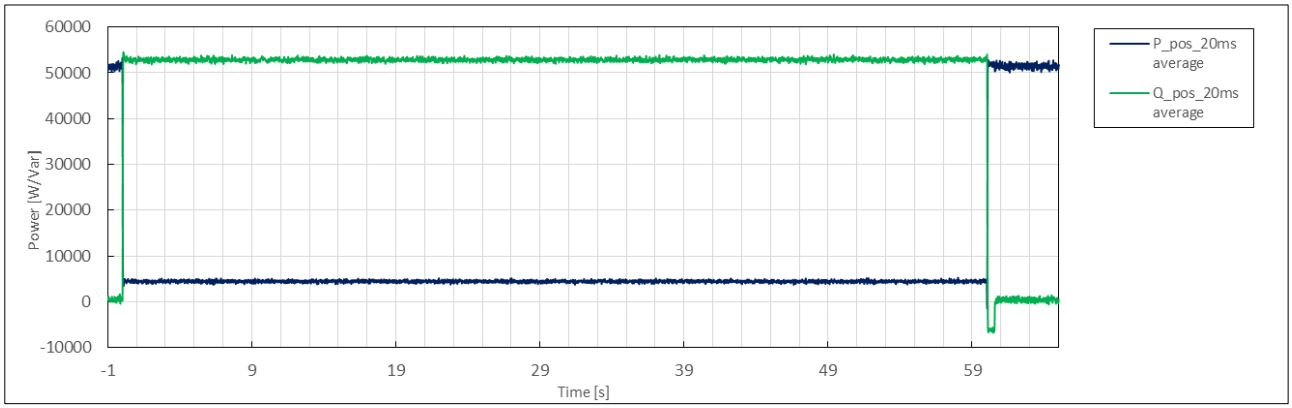

Current [A]
Time [s]
IP_pos
IP_posstd


100
80
60
40
20
0
-20
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos

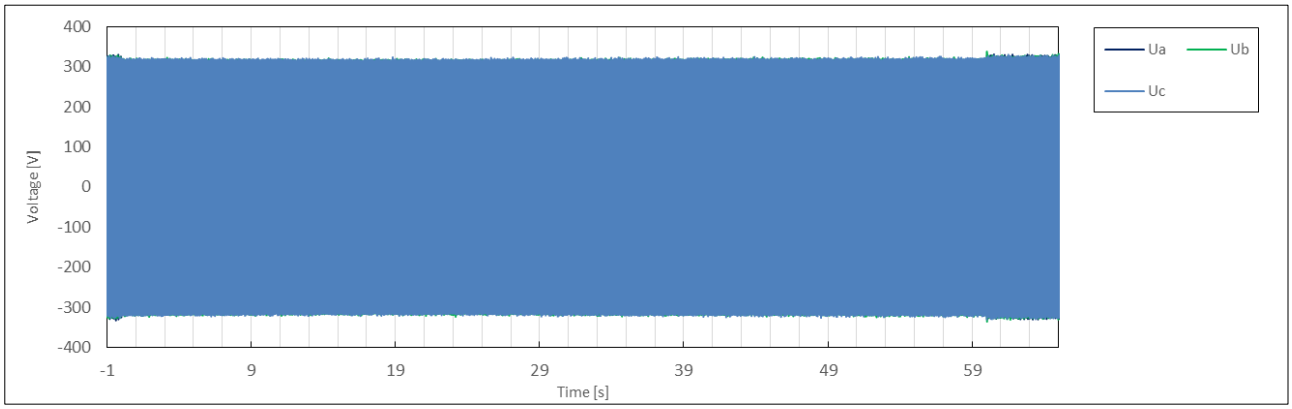

180
160
140
120
100
80
60
40
20
0
-20
Current [A]
-1
9
19
29
39
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Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

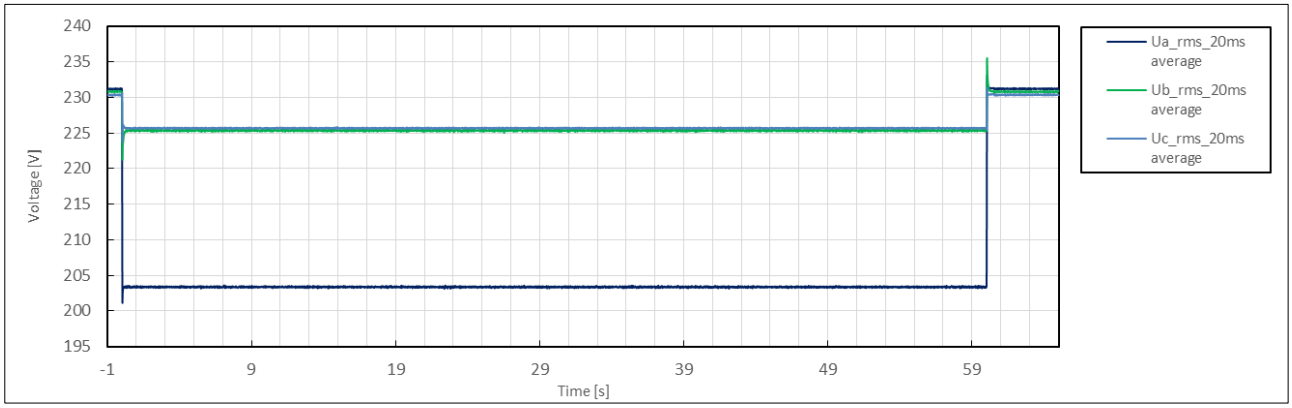

15
10
5
0
-5
-10
-15
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg

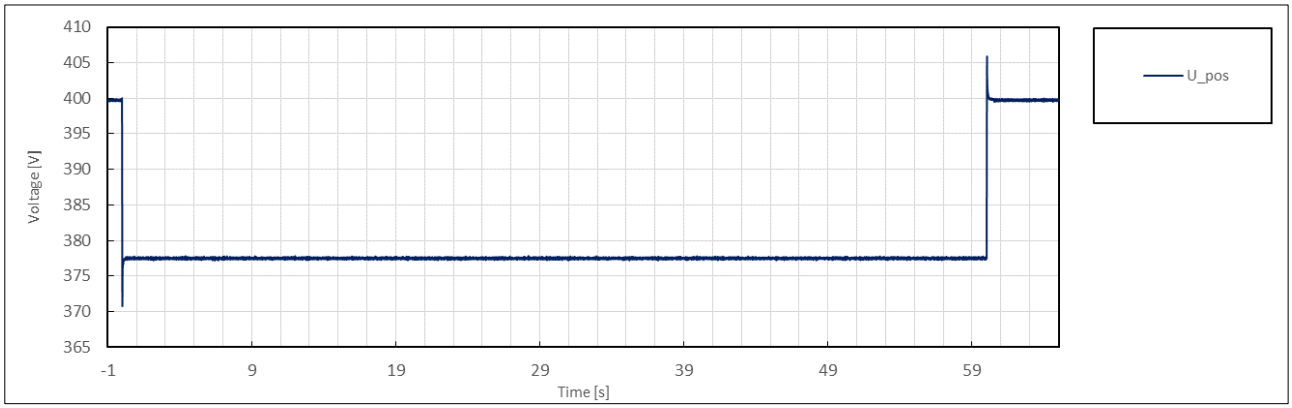

50
40
30
20
10
0
-10
-20
-30
-40
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim



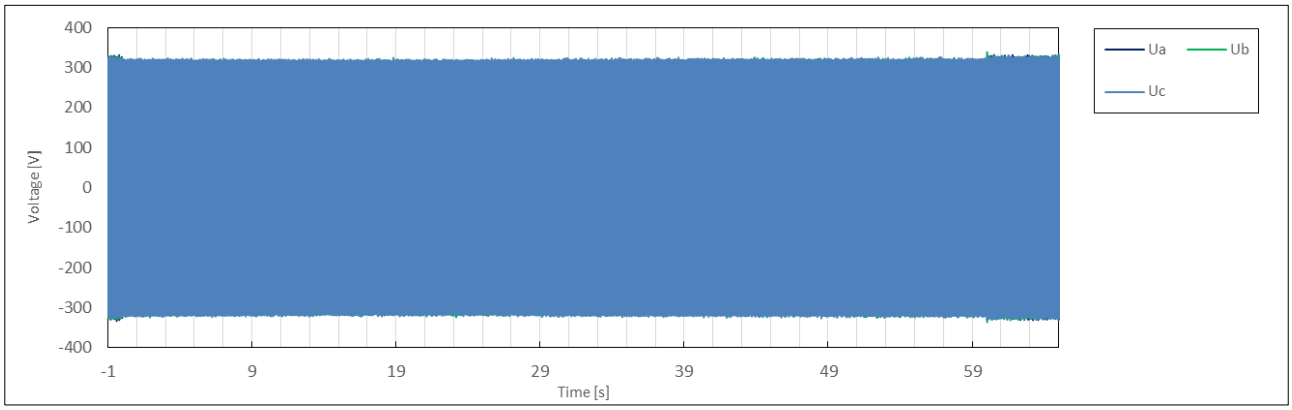
No. 5.3 Idle Test

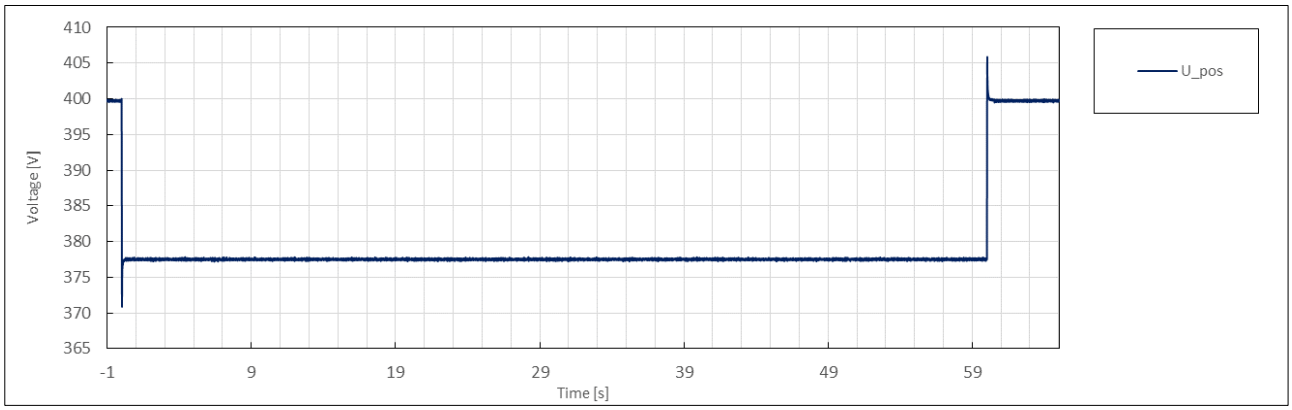


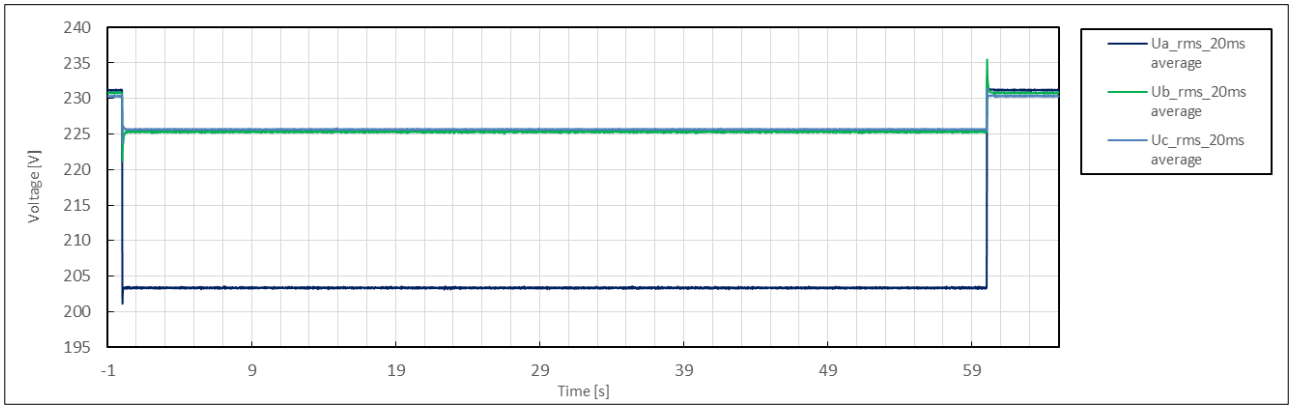


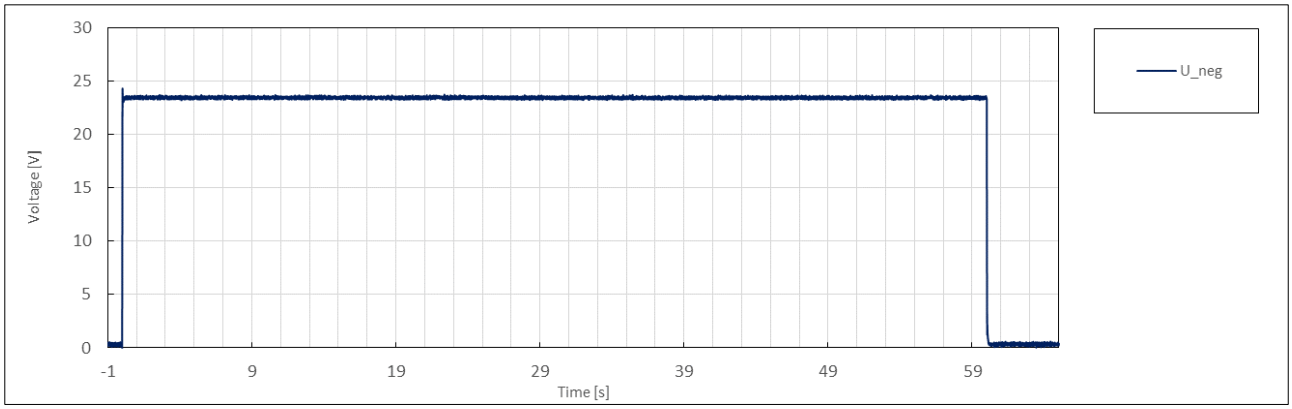

410
405
400
395
390
385
380
375
370
365
Voltage [V]
-1
9
19
29
39
49
59
Time [s]
U_pos

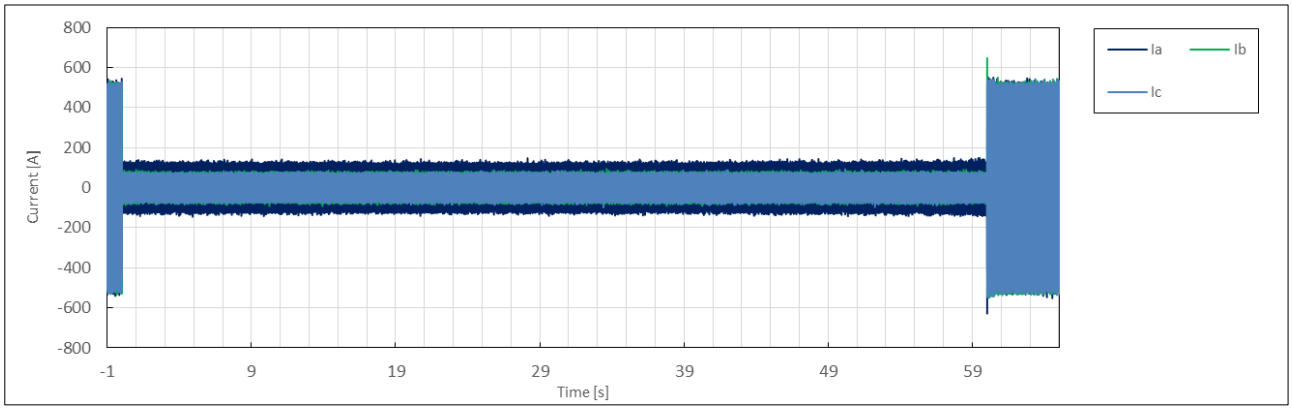
No. 5.3 Load Test

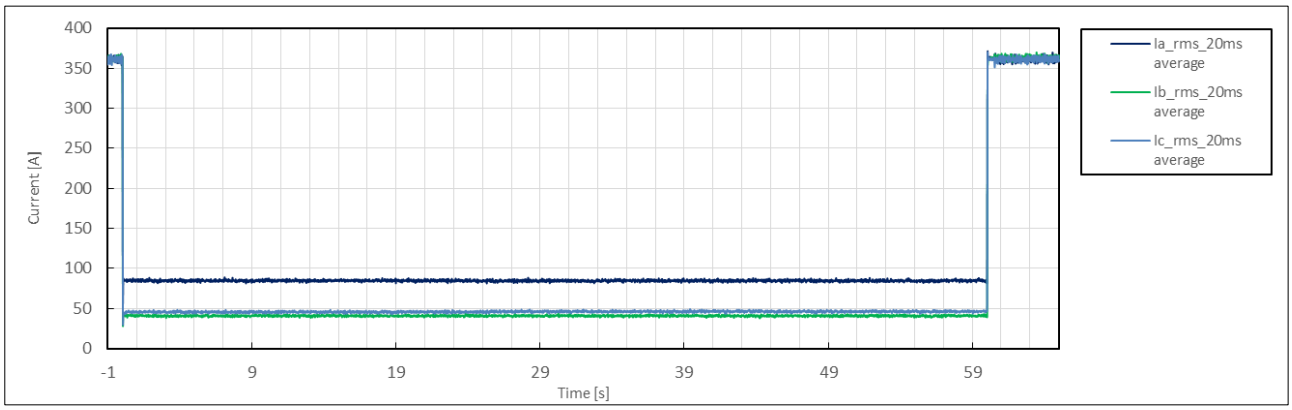


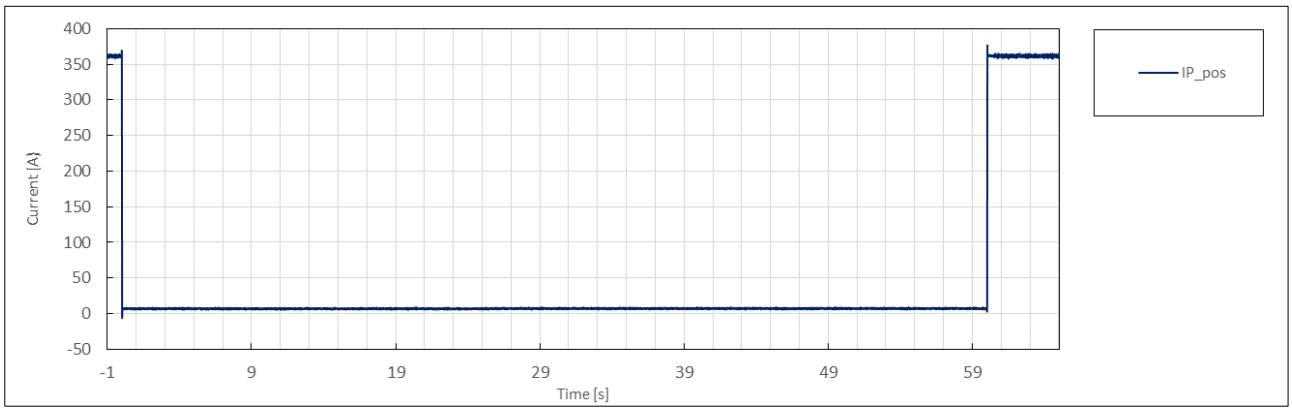


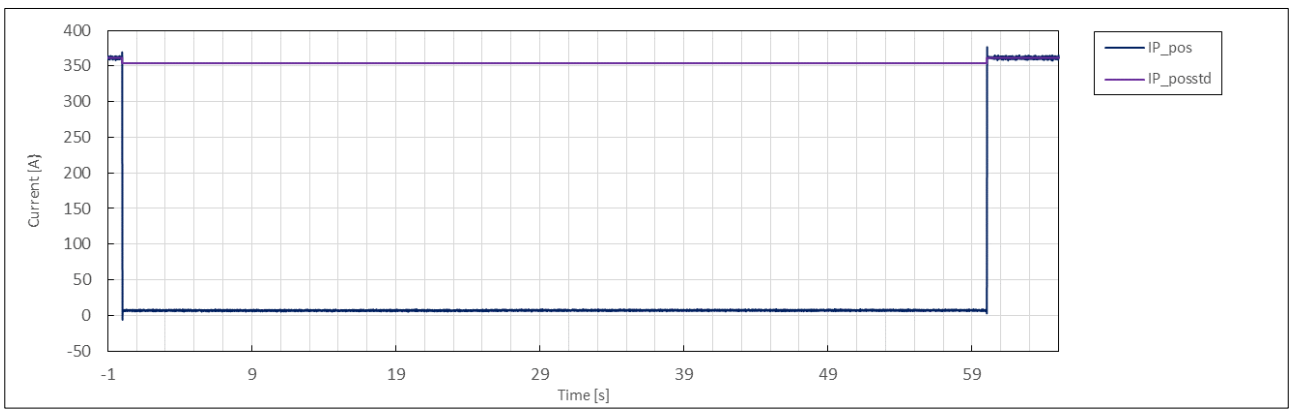


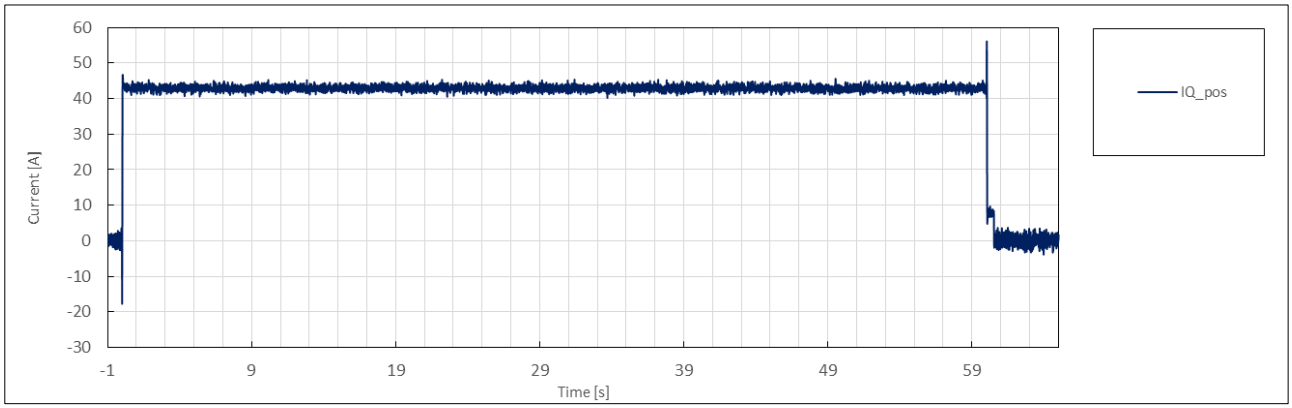


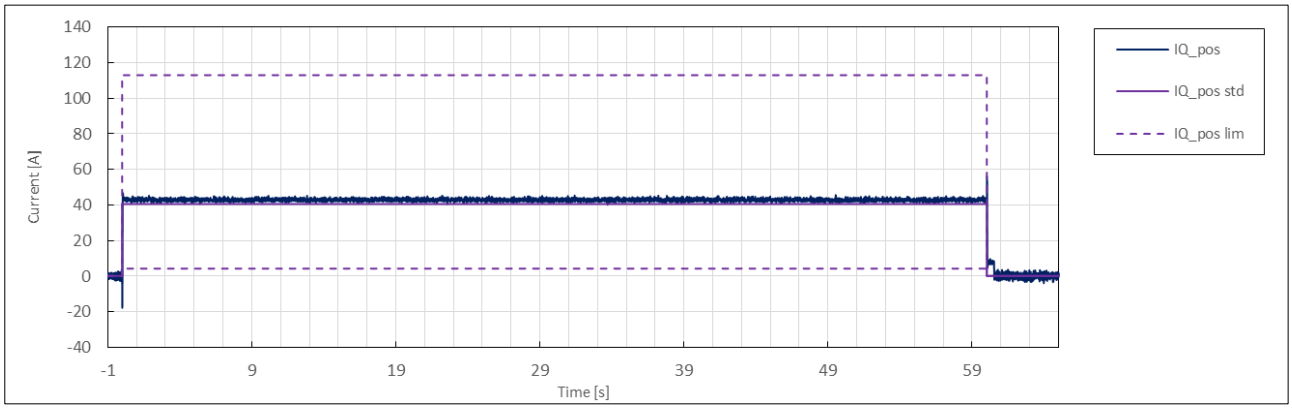

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
9
19
29
39
49
59
Time [s]
Ia
Ib
Ic

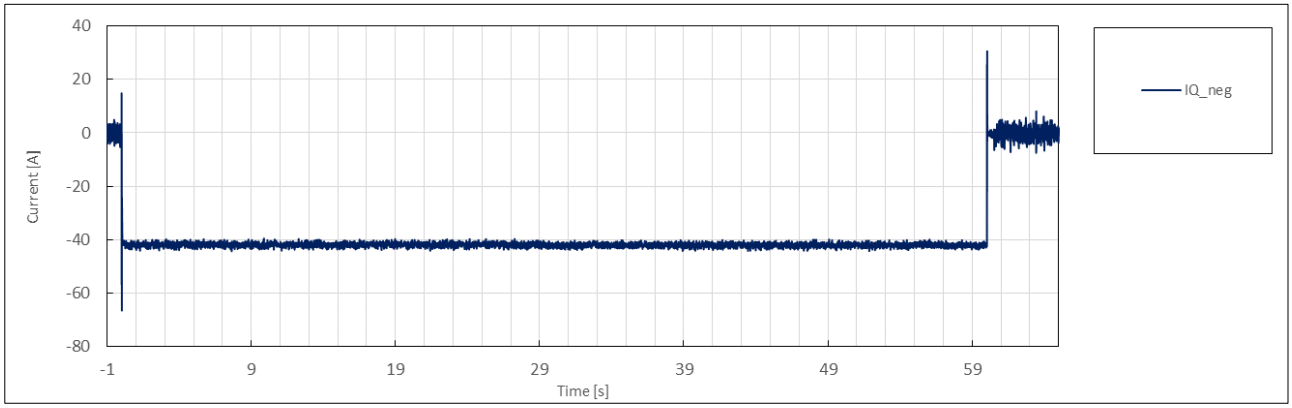

400
350
300
250
200
150
100
50
0
Current [A]
-1
9
19
29
39
49
59
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

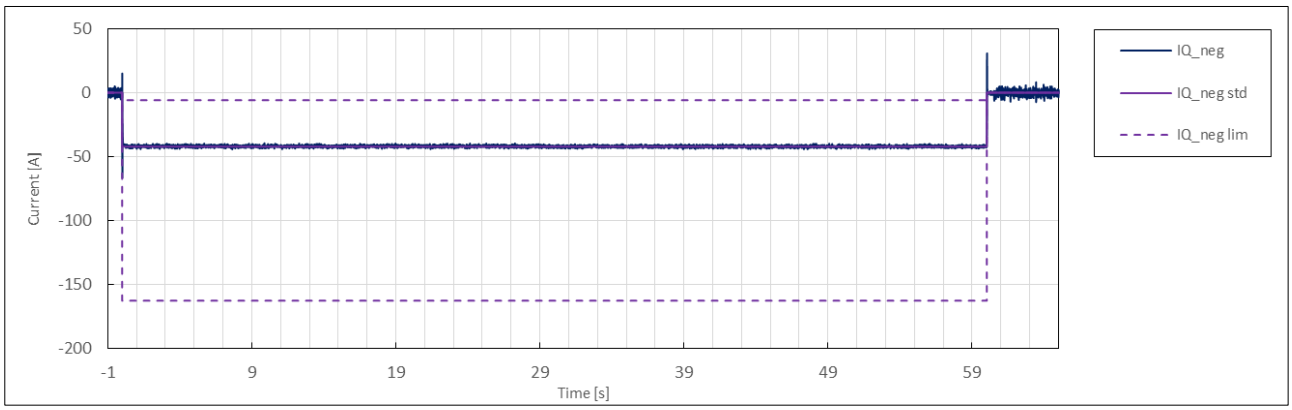

400
350
300
250
200
150
100
50
0
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IP_pos

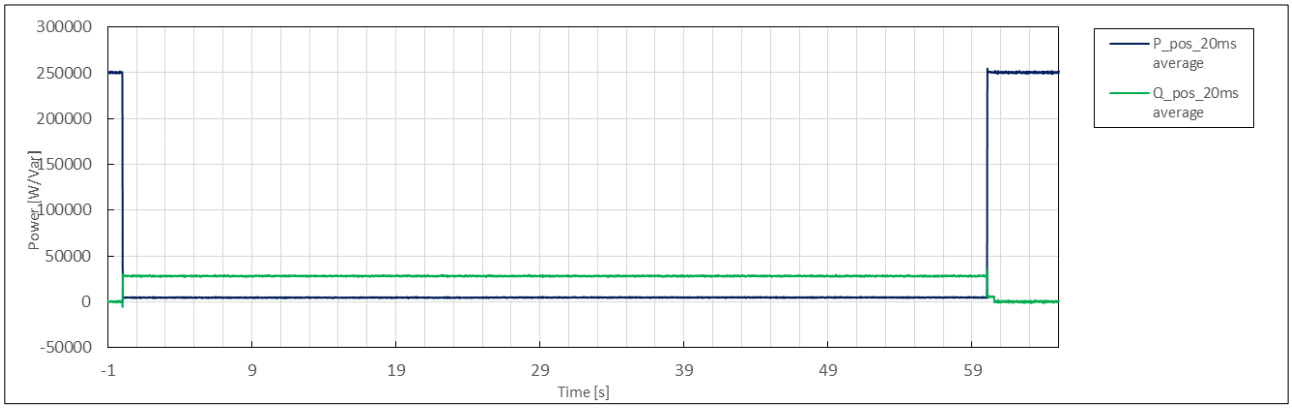

400
350
300
250
200
150
100
50
0
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IP_pos
IP_posstd


60
50
40
30
20
10
0
-10
-20
-30
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos

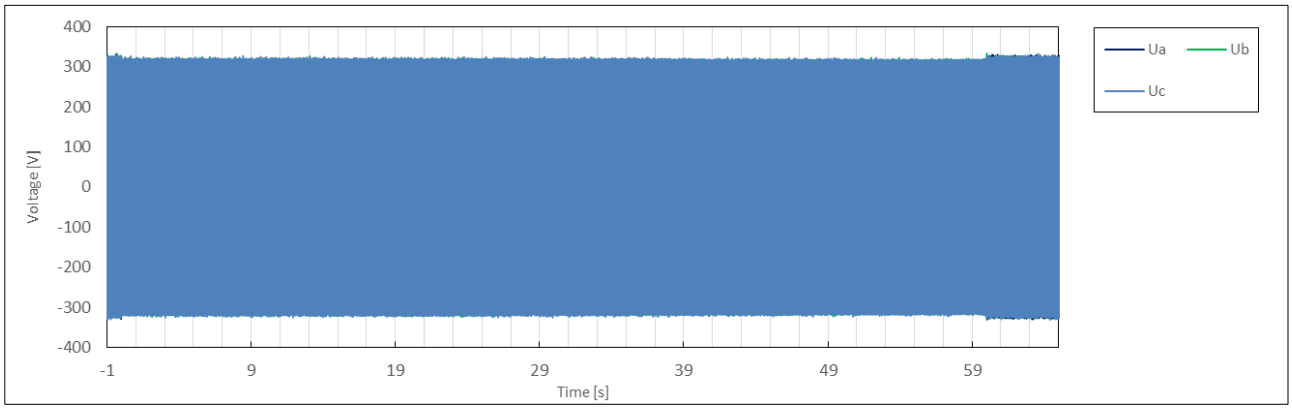

140
120
100
80
60
40
20
0
-20
-40
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

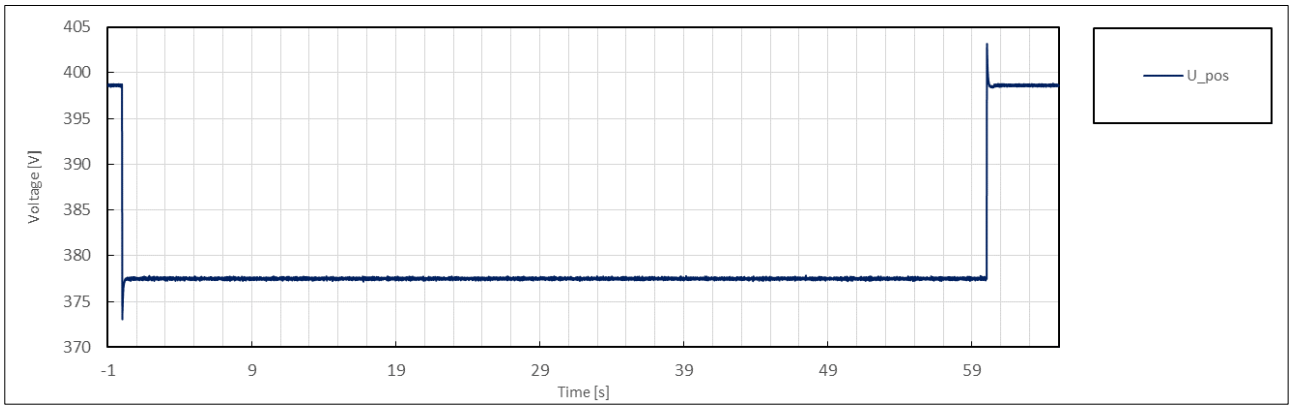

40
20
0
-20
-40
-60
-80
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg

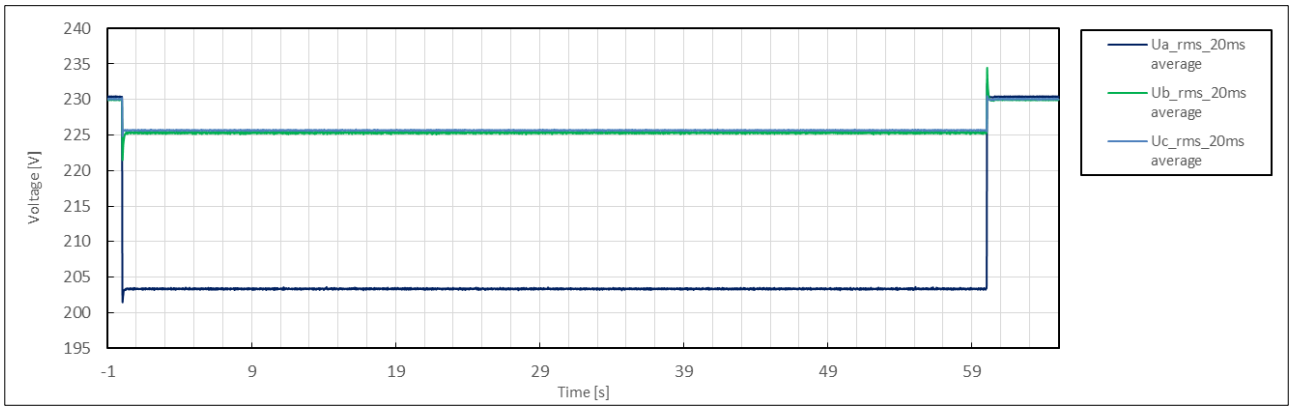

50
0
-50
-100
-150
-200
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
9
19
29
39
49
59
Time [s]
P_pos_20ms average
Q_pos_20ms average

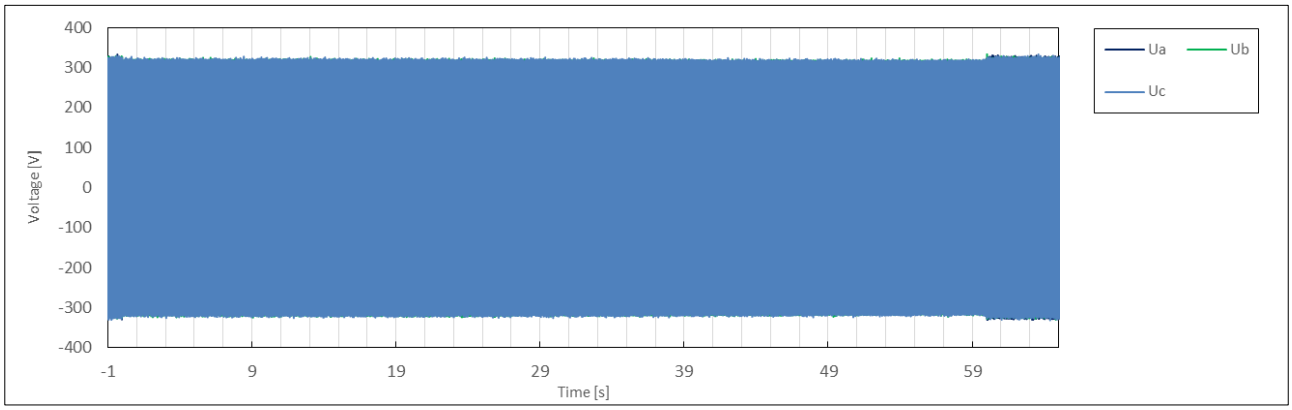
No. 5.4 Idle Test

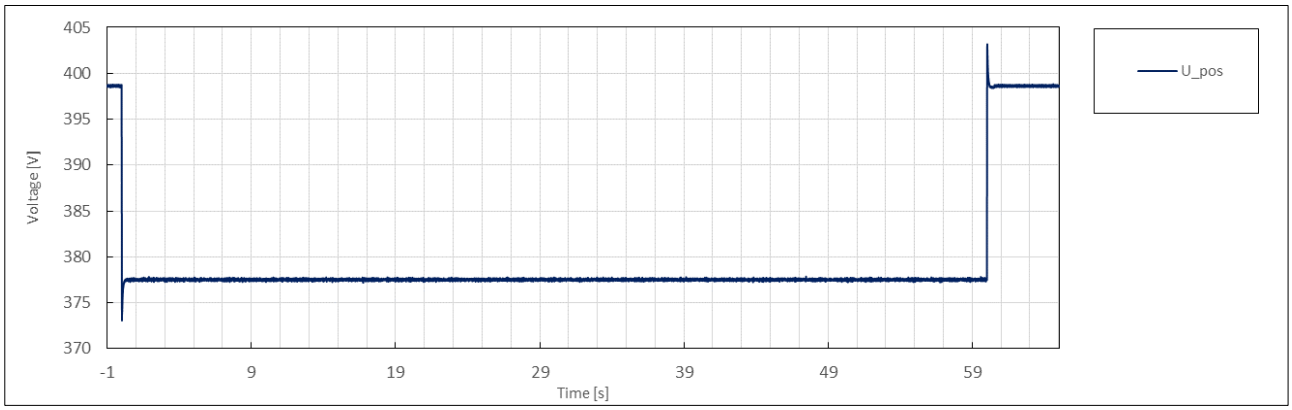


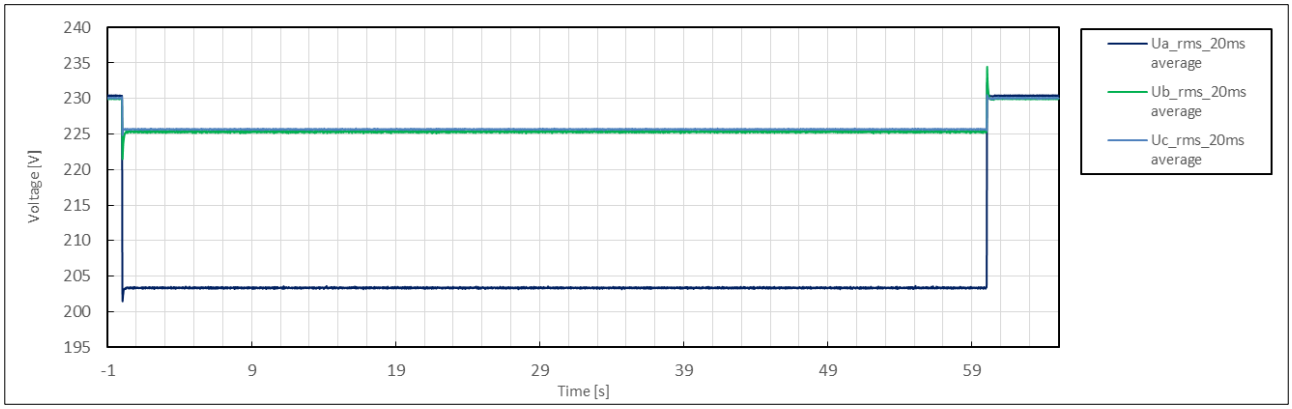


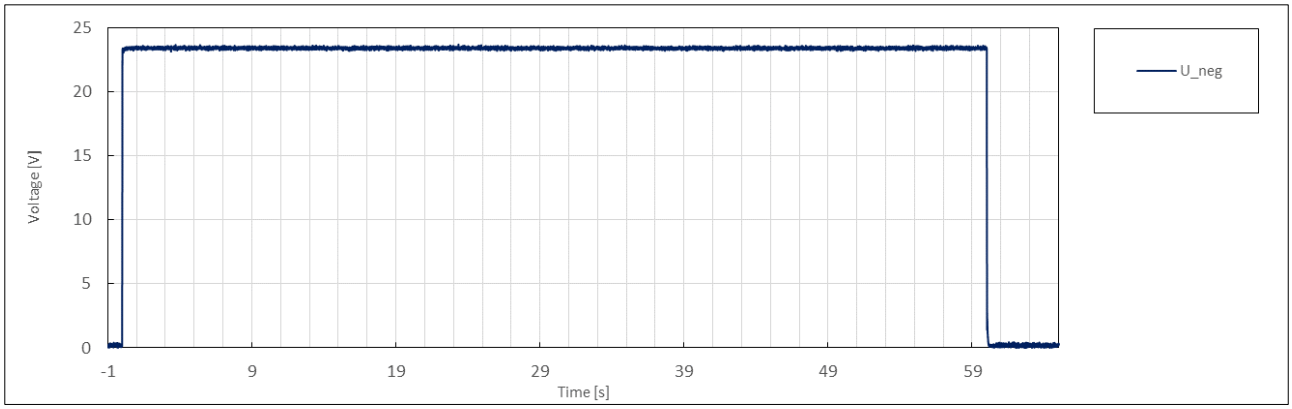


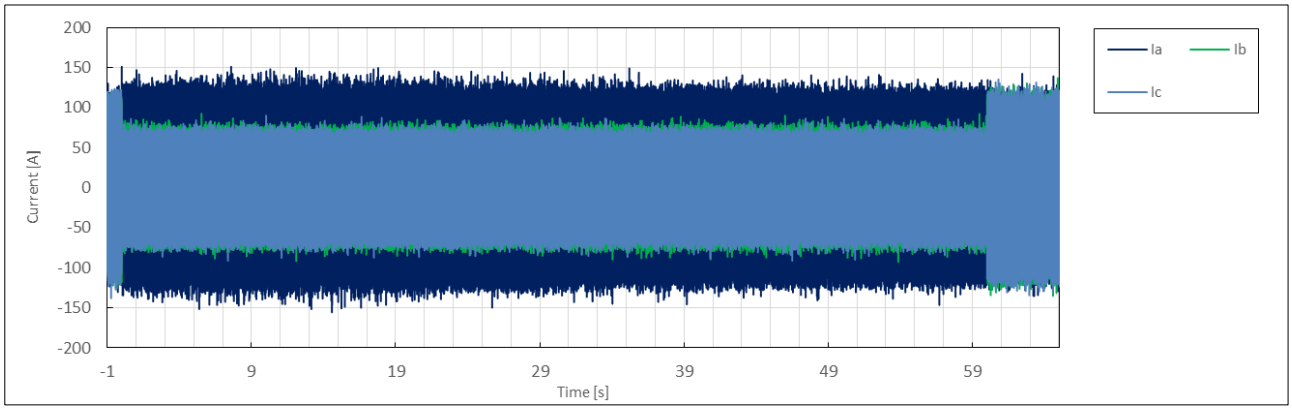
No. 5.4 Load Test

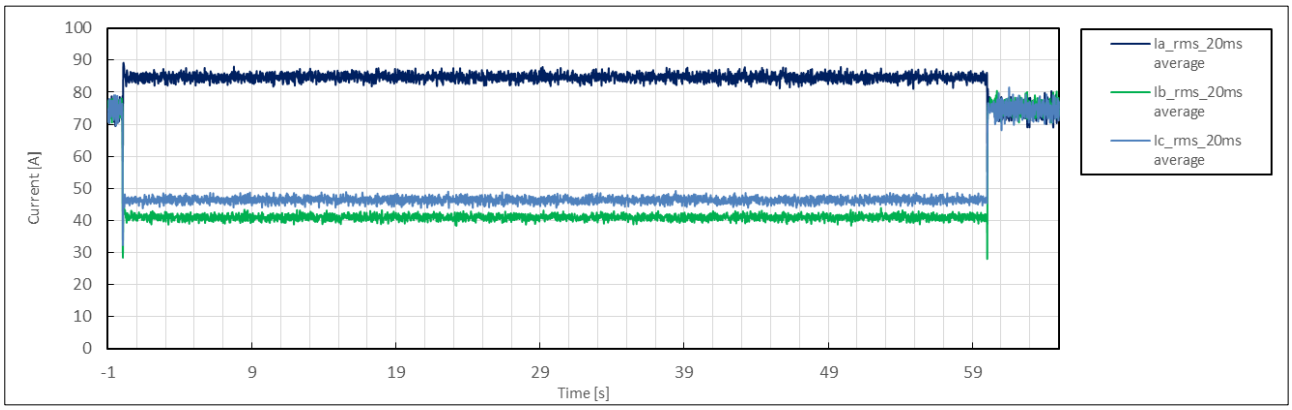


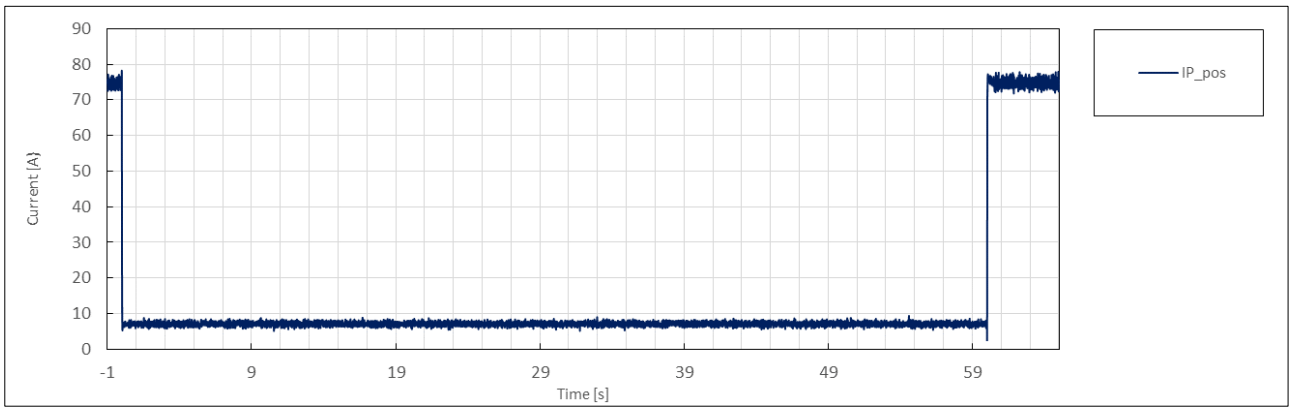


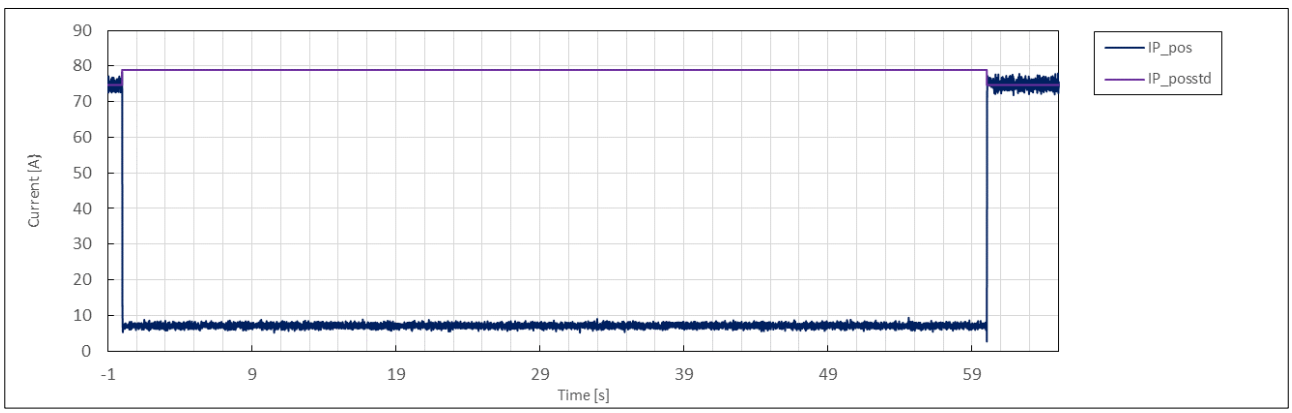


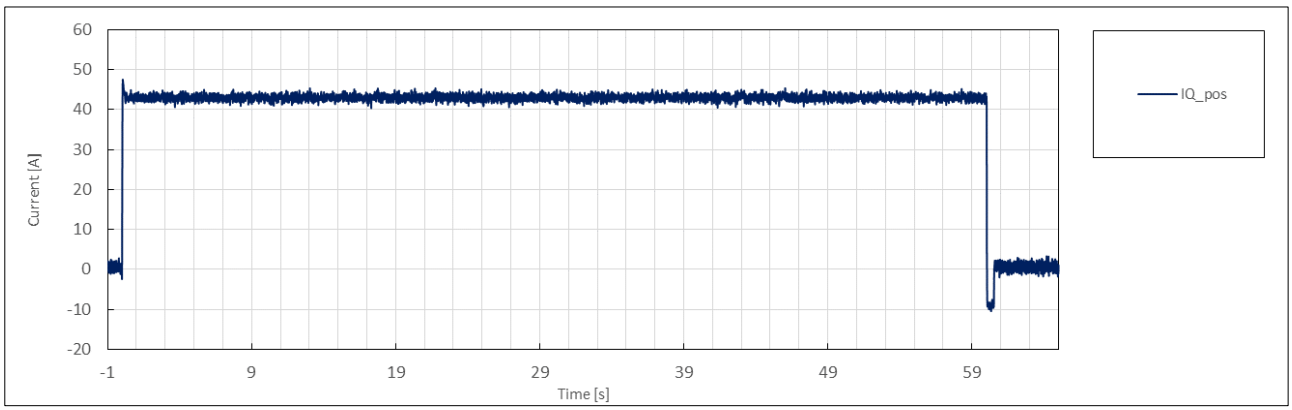


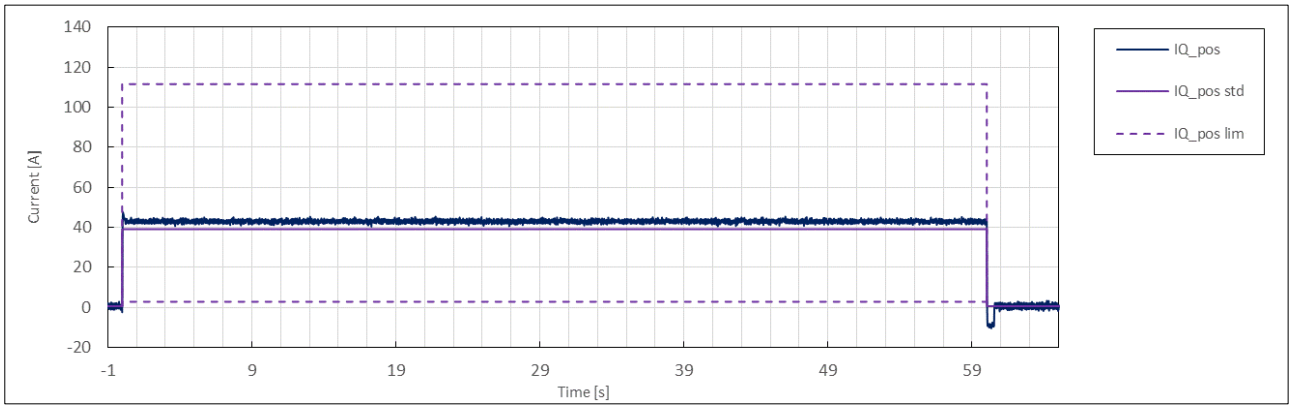

Current [A]
Time [s]
Ia
Ib
Ic

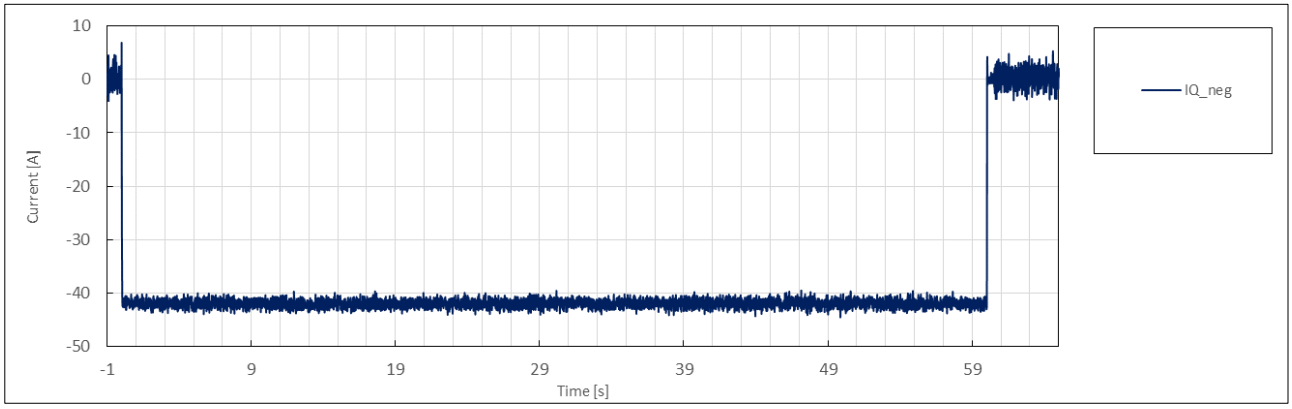

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

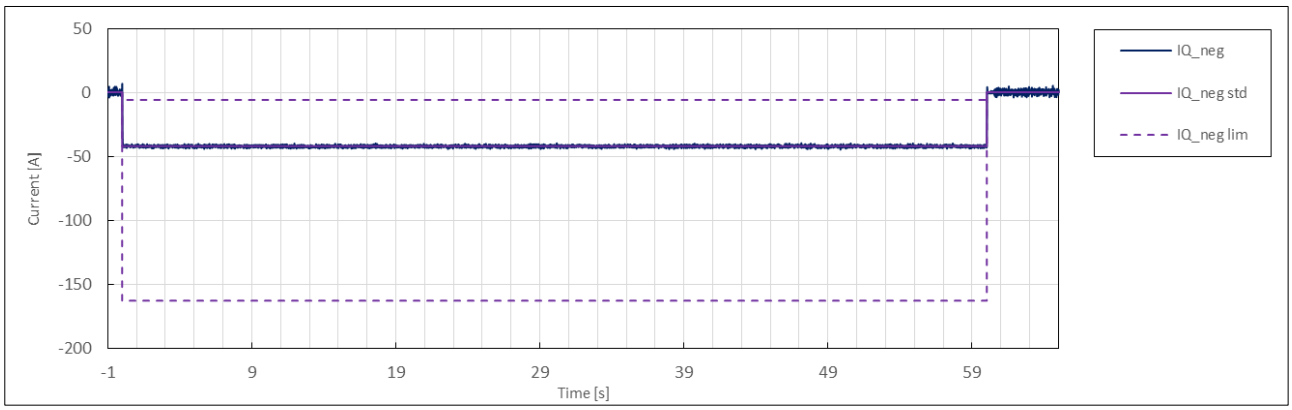

Current [A]
Time [s]
IP_pos

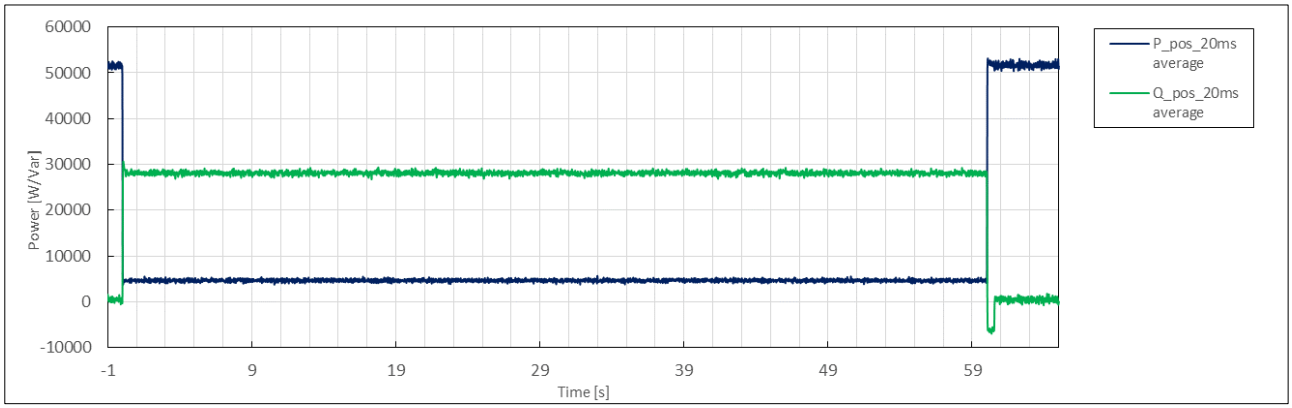

Current [A]
Time [s]
IP_pos
IP_posstd


60
50
40
30
20
10
0
-10
-20
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos

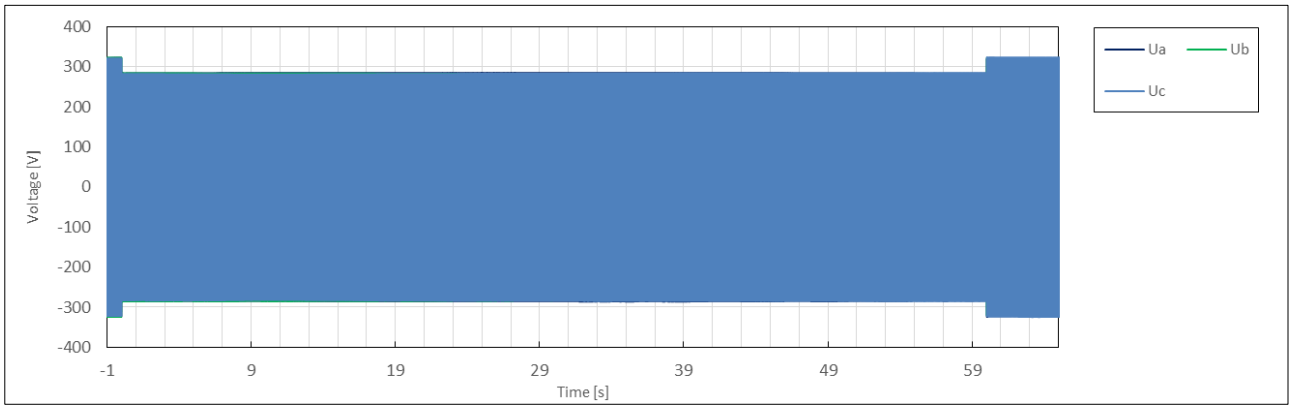

140
120
100
80
60
40
20
0
-20
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

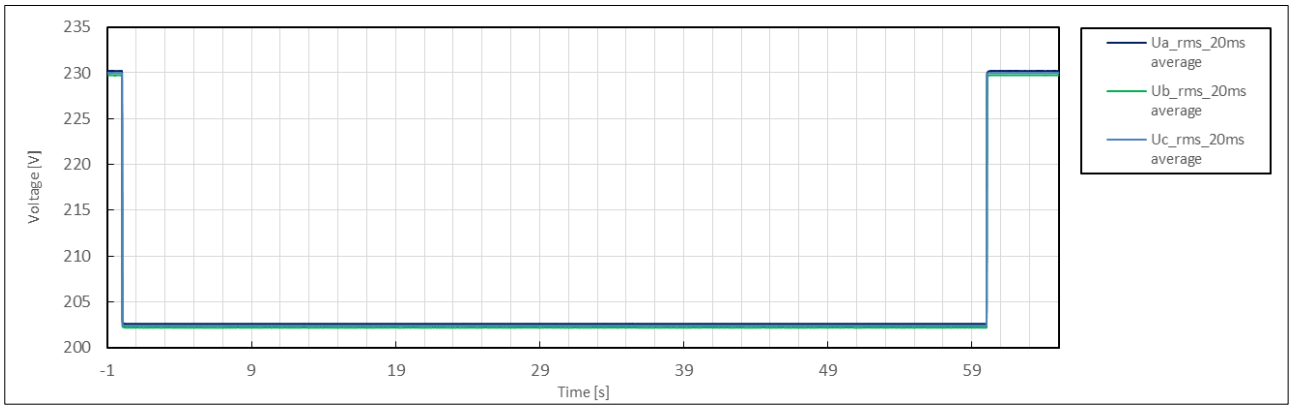

10
0
-10
-20
-30
-40
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg

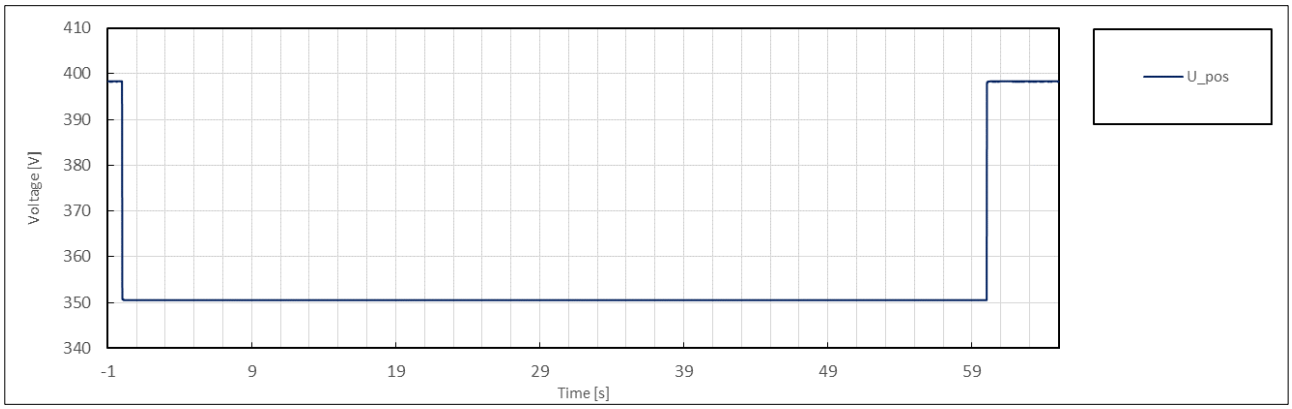

50
0
-50
-100
-150
-200
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


60000
50000
40000
30000
20000
10000
0
-10000
Power [W/Var]
-1
9
19
29
39
49
59
Time [s]
P_pos_20ms average
Q_pos_20ms average

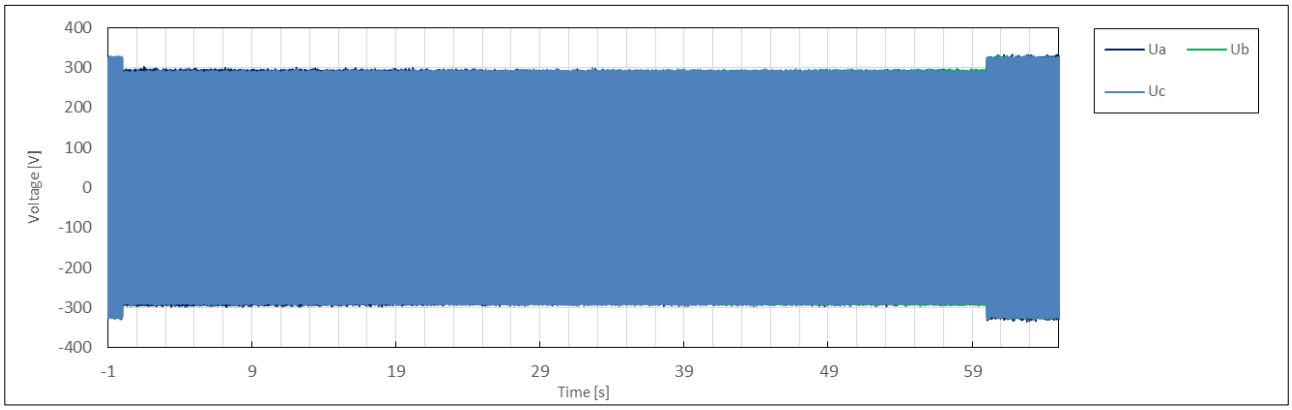
No. 5.5 Idle Test

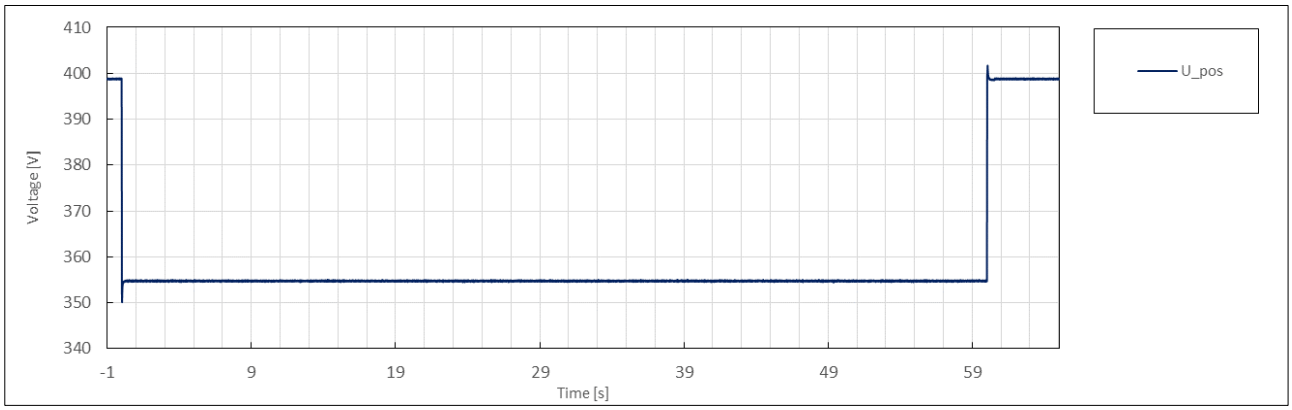


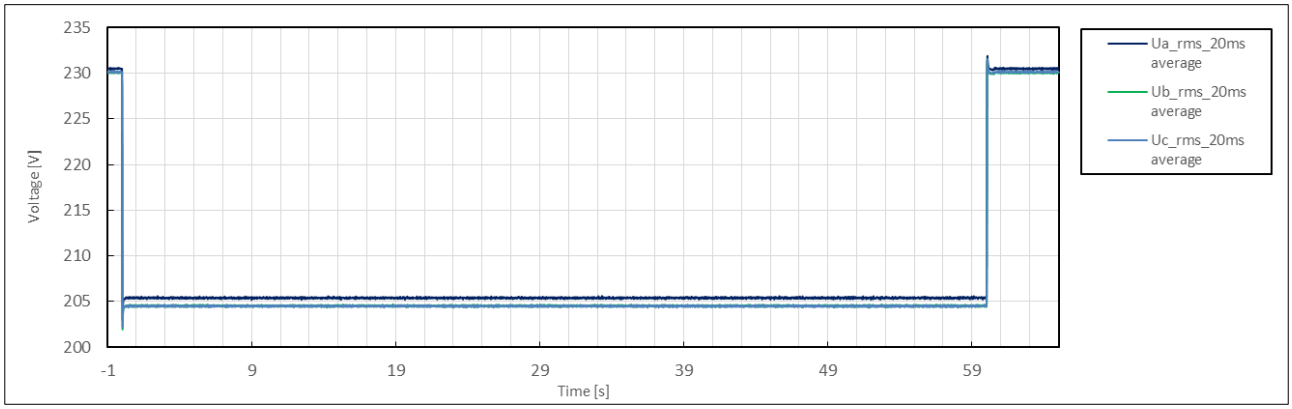


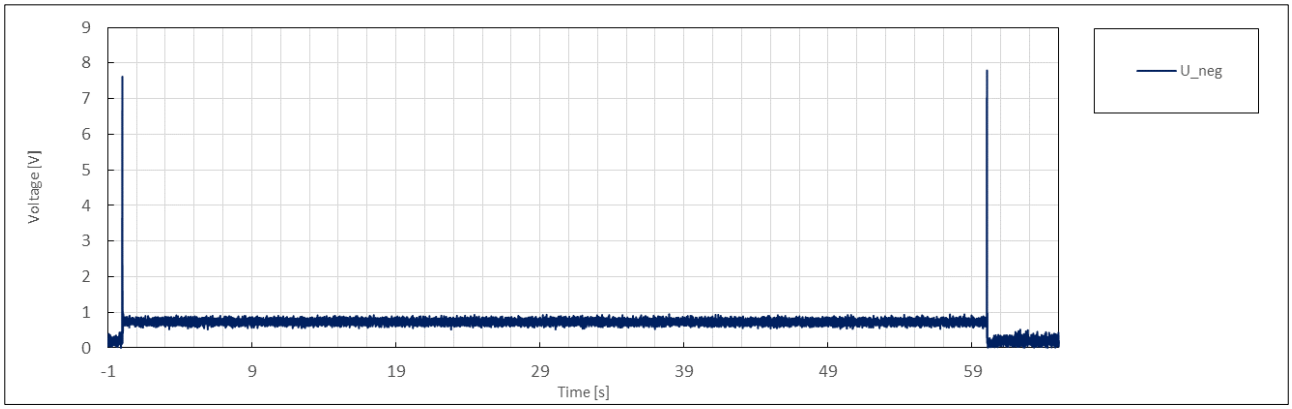


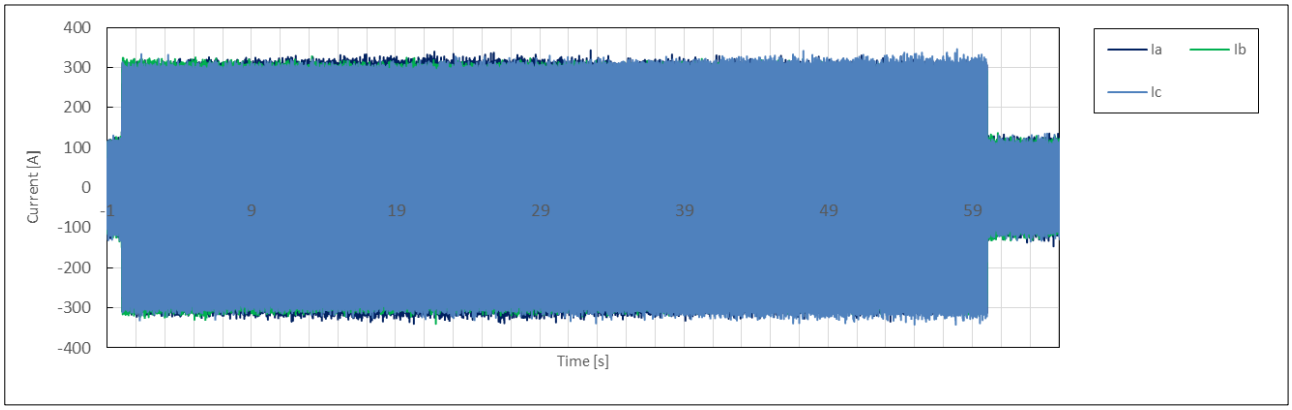
No. 5.5 Load Test

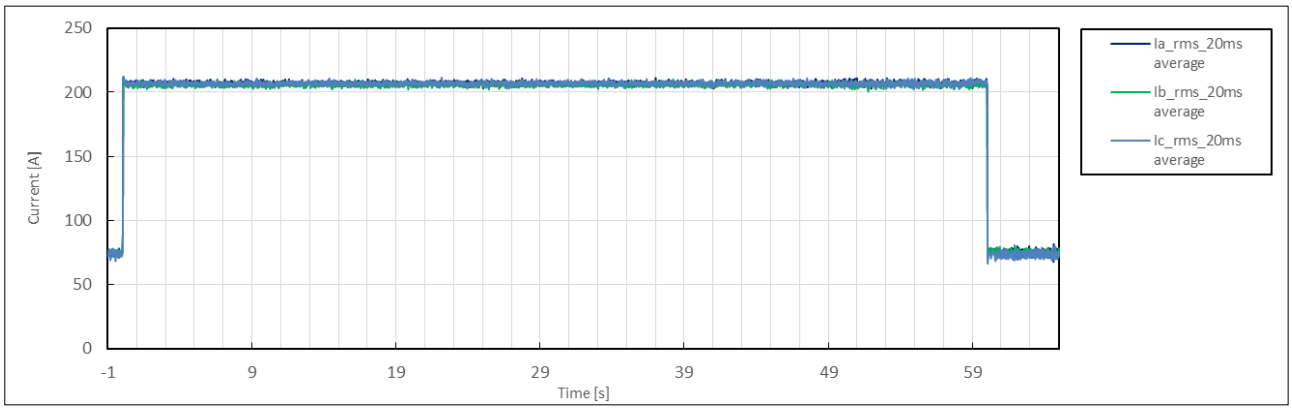


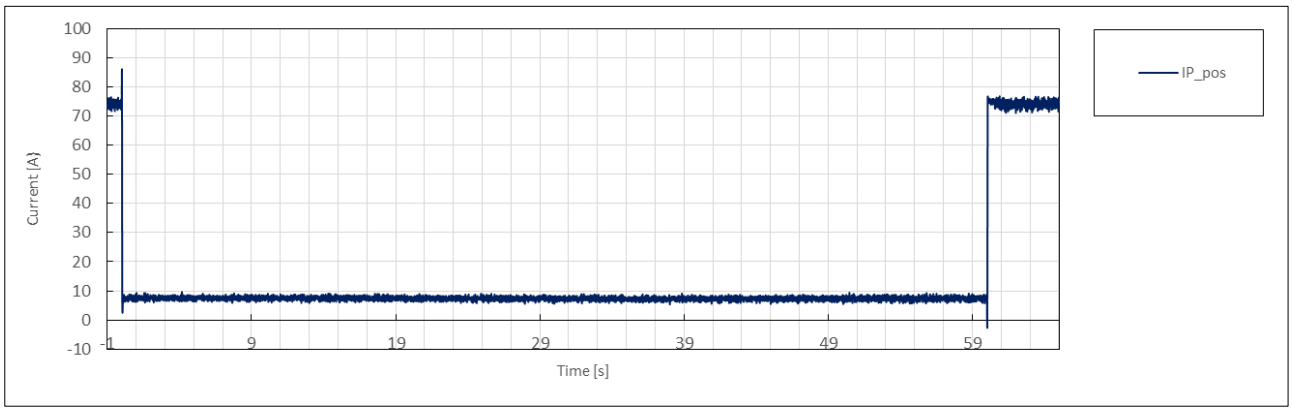


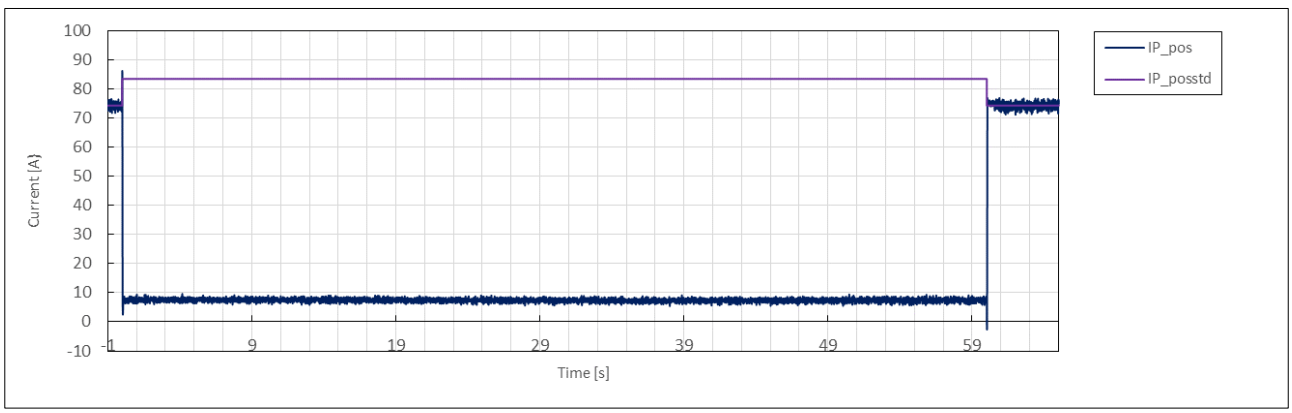


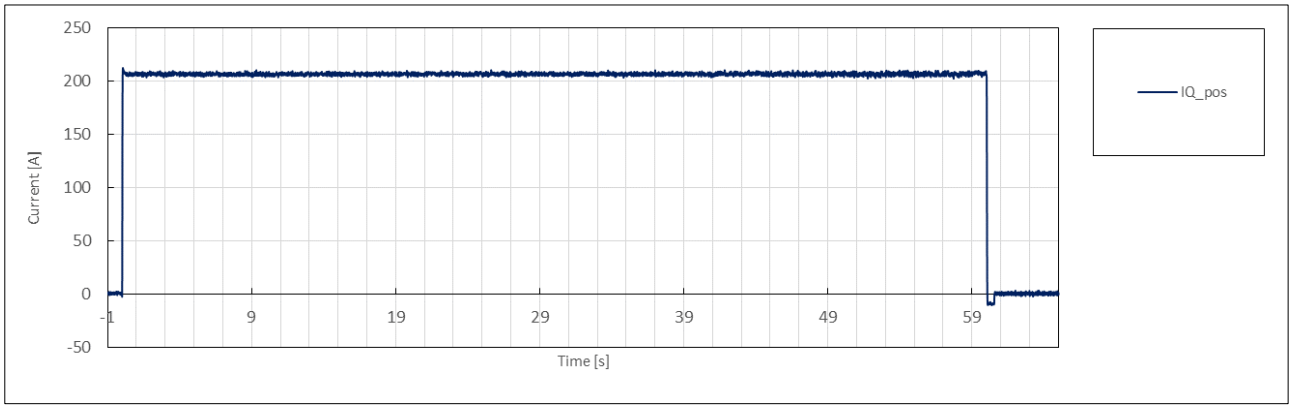


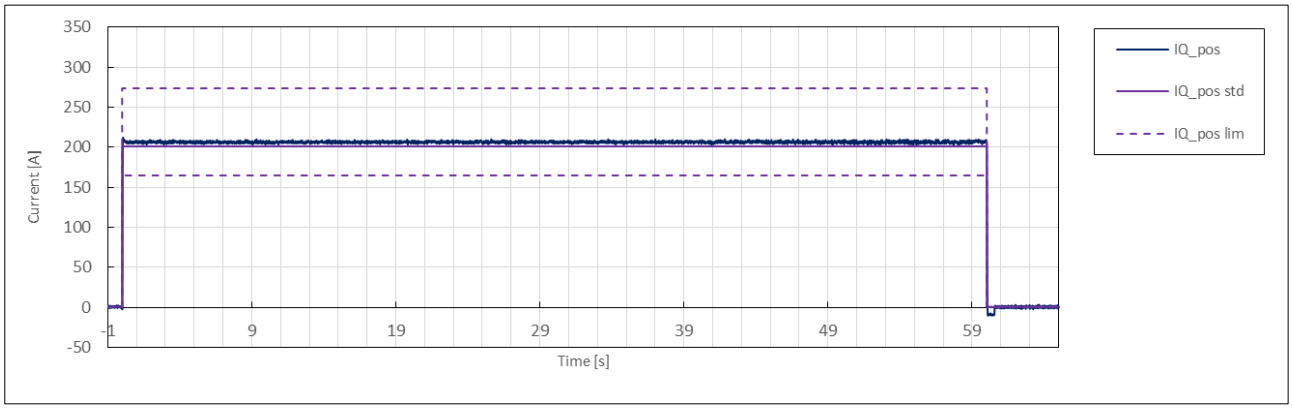

Current [A]
Time [s]
Ia
Ib
Ic

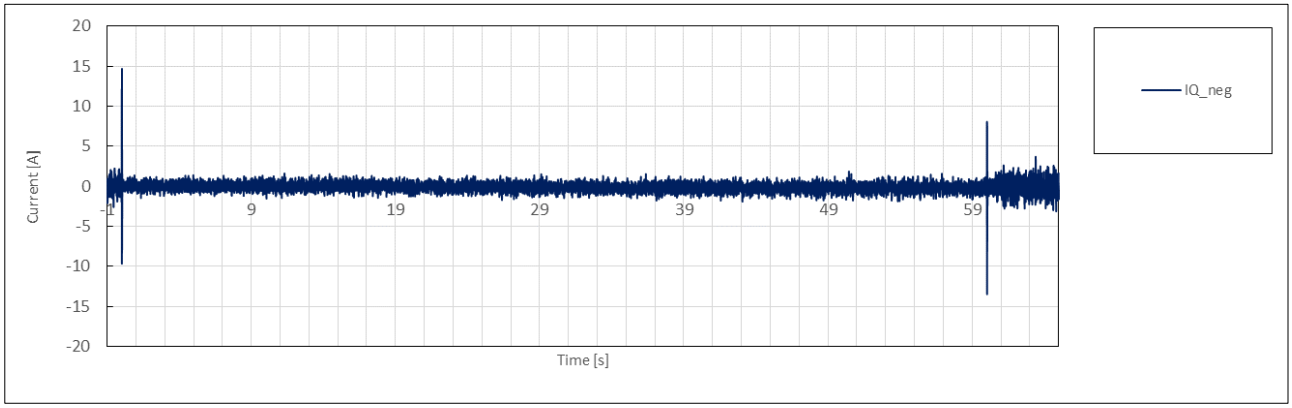

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

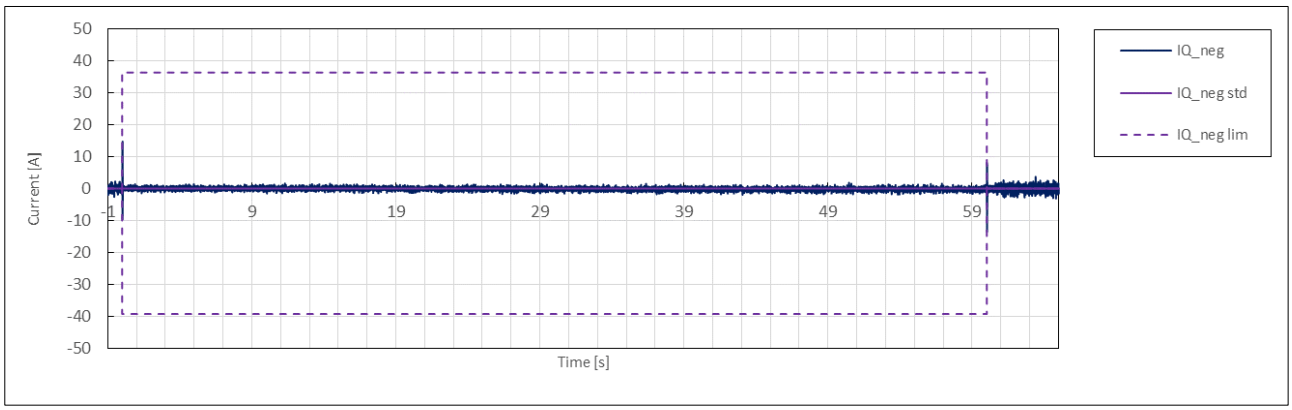

Current [A]
Time [s]
IP_pos

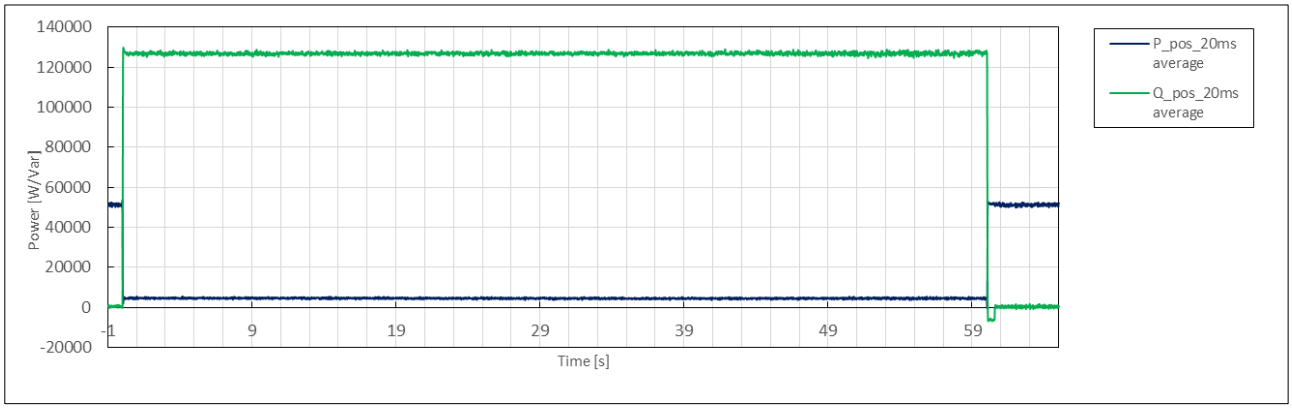

Current [A]
Time [s]
IP_pos
IP_posstd


250
200
150
100
50
0
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos

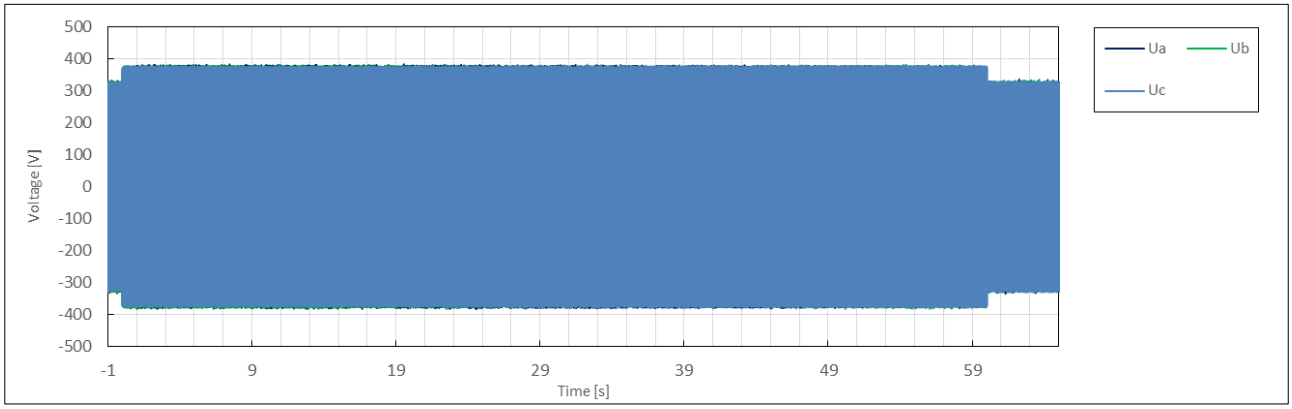

350
300
250
200
150
100
50
0
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

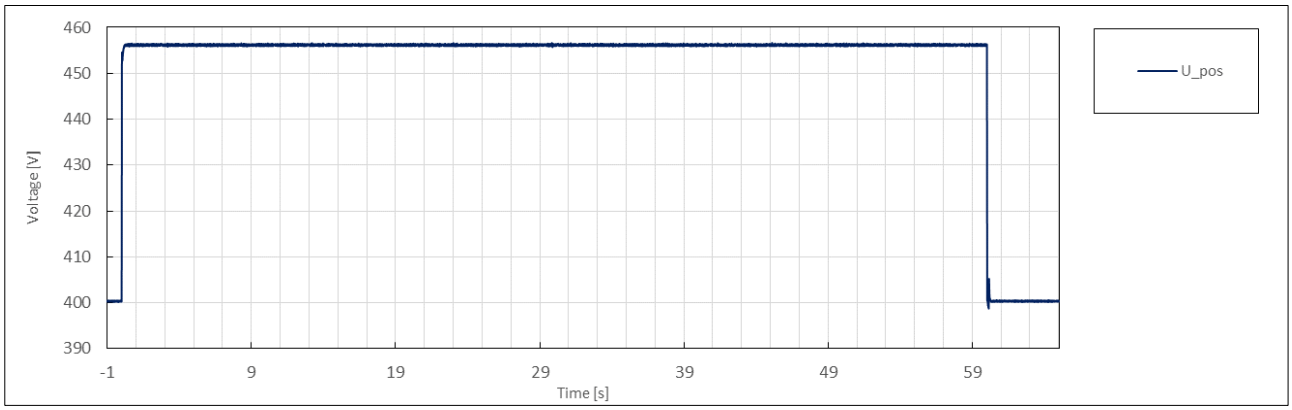

20
15
10
5
0
-5
-10
-15
-20
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg

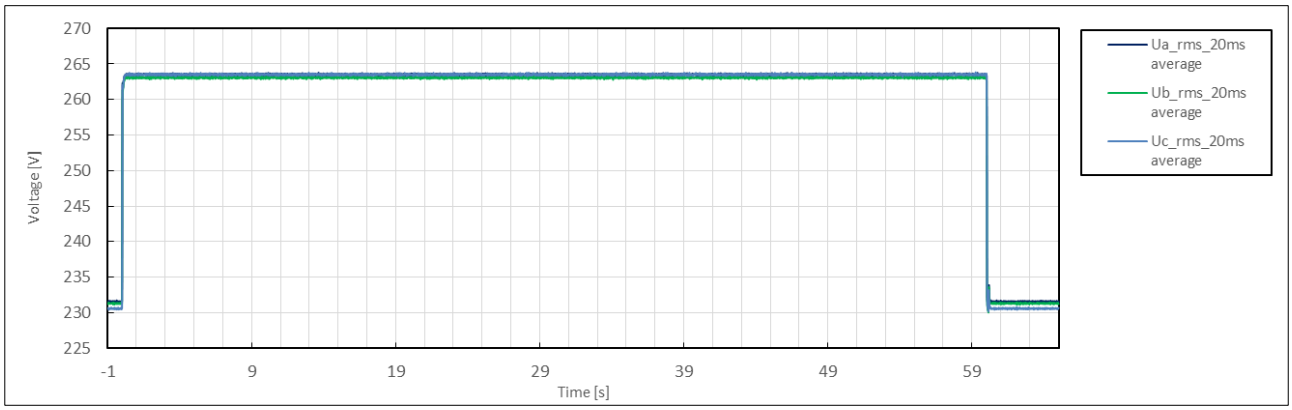

50
40
30
20
10
0
-10
-20
-30
-40
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


140000
120000
100000
80000
60000
40000
20000
0
-20000
Power [W/Var]
-1
9
19
29
39
49
59
Time [s]
P_pos_20ms average
Q_pos_20ms average

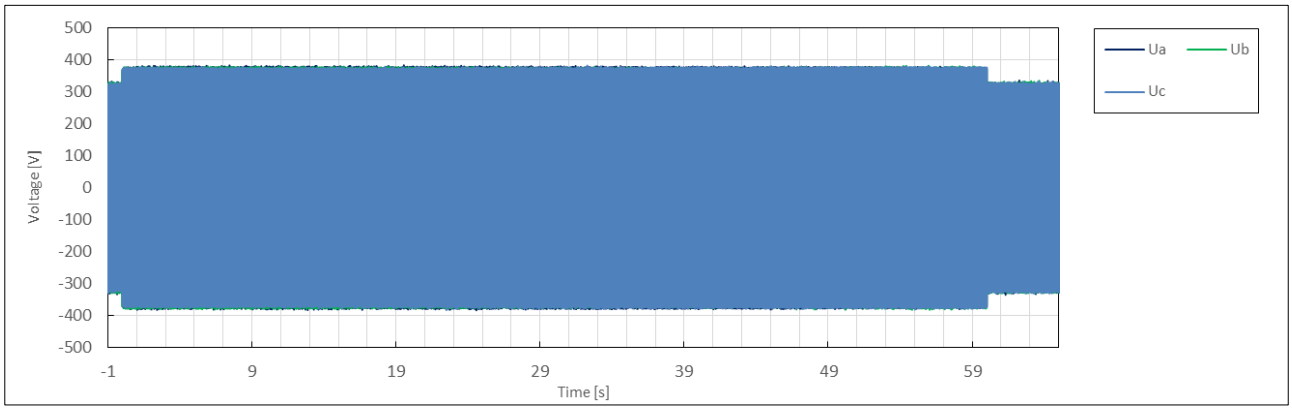
No. 6.1 Idle Test

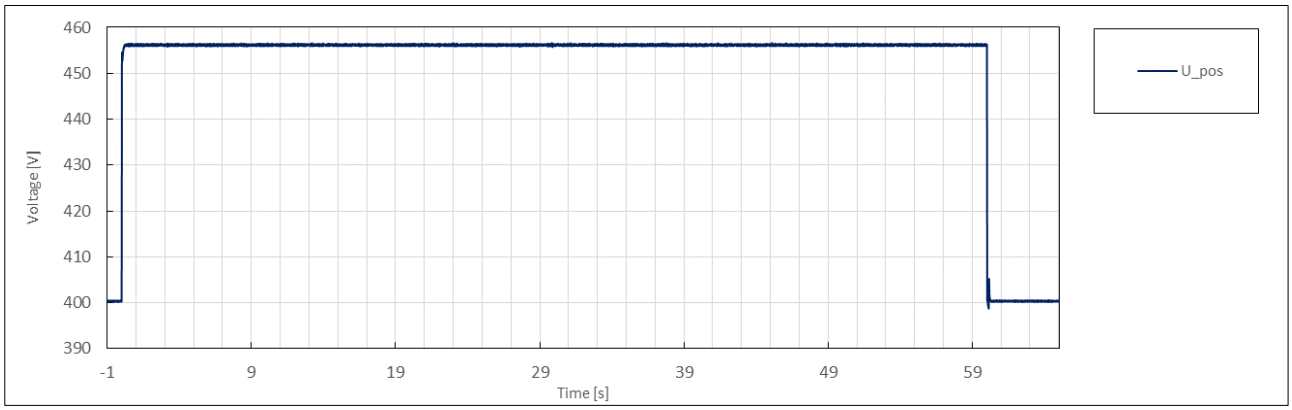


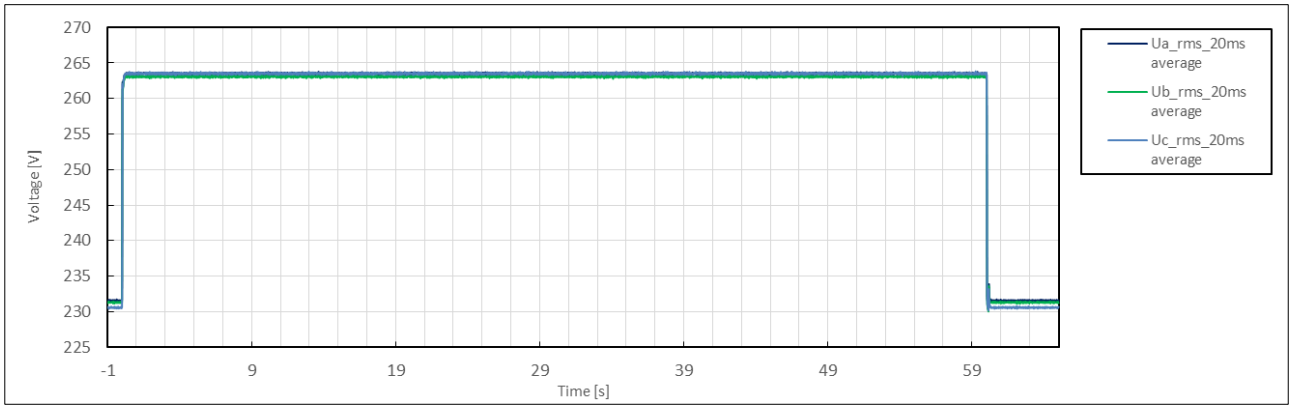


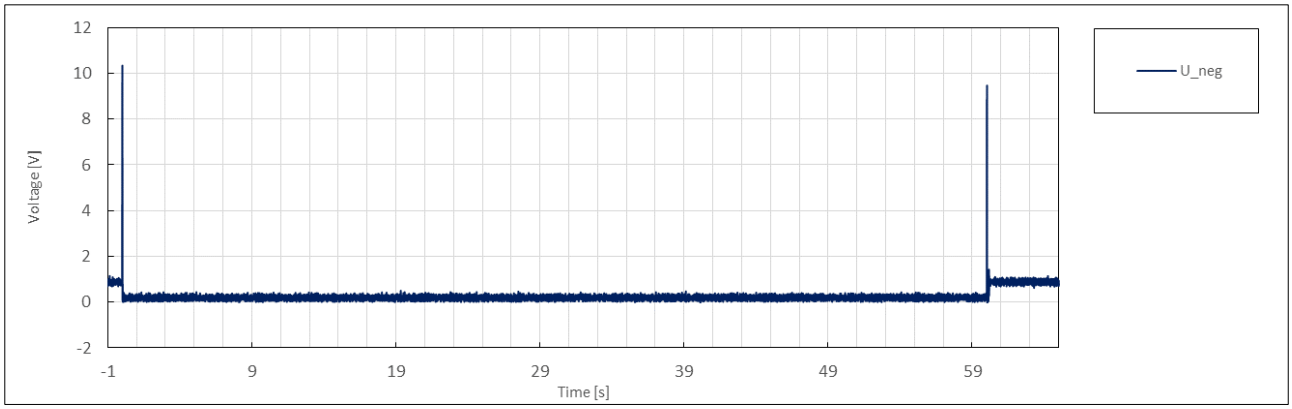


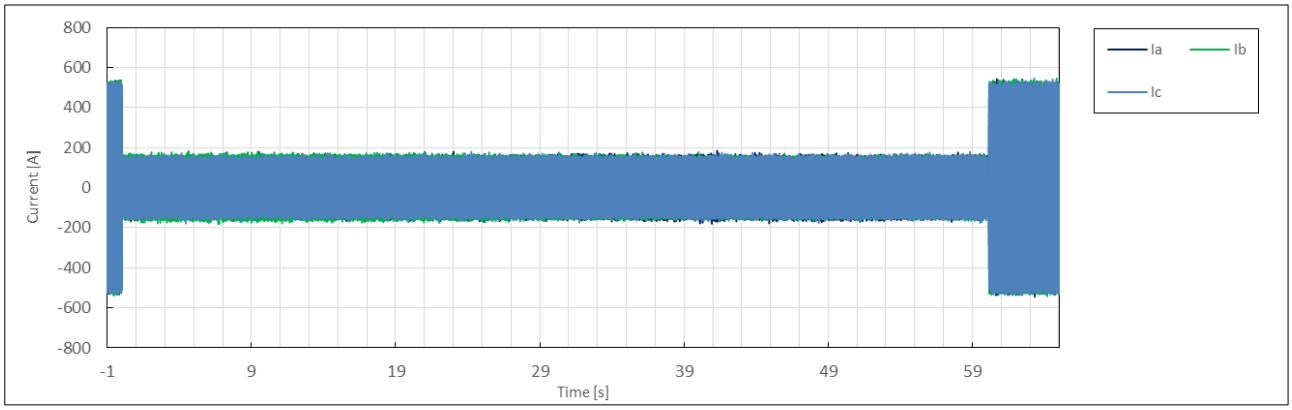
No. 6.1 Load Test

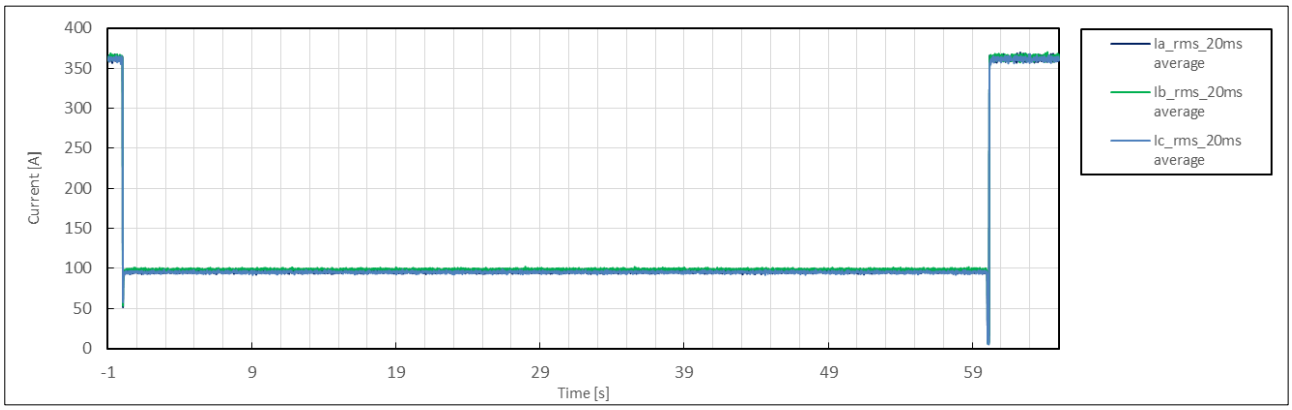


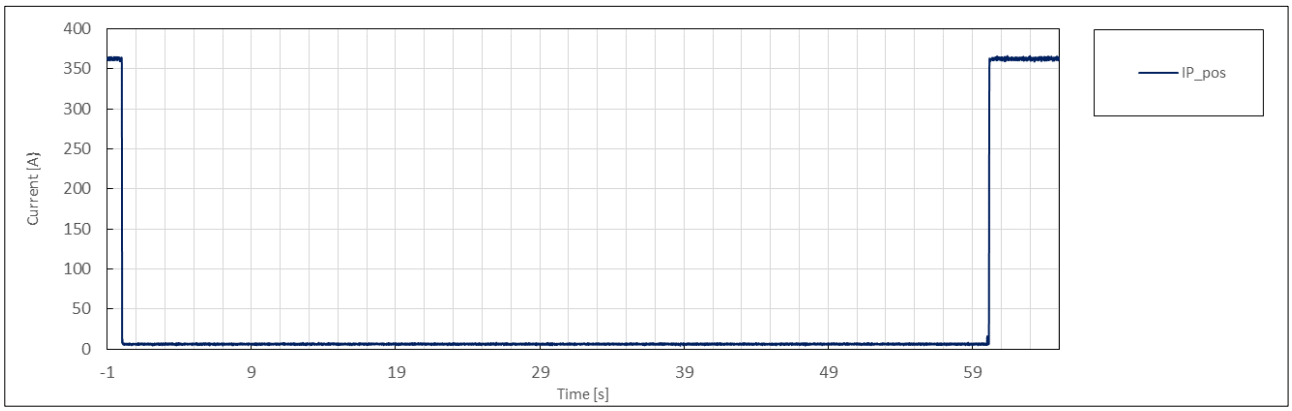


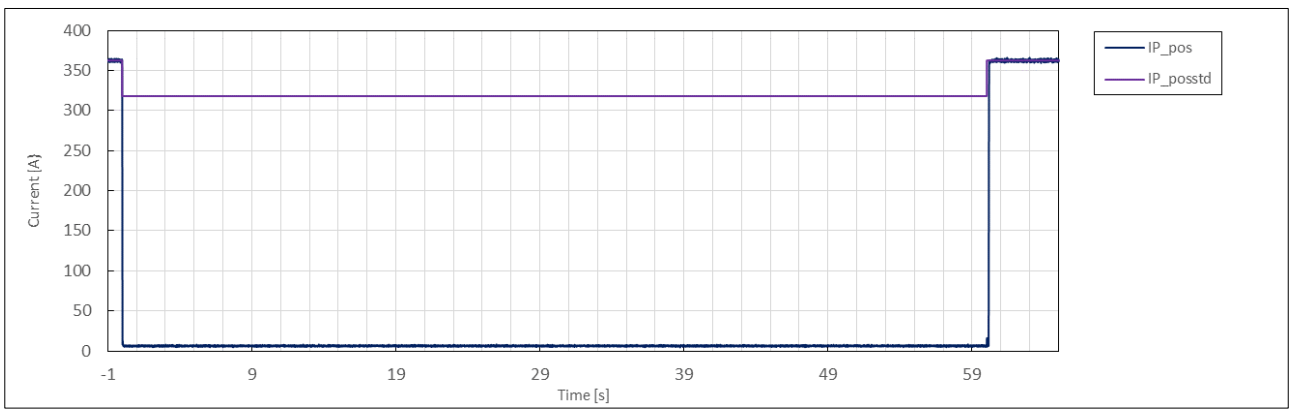


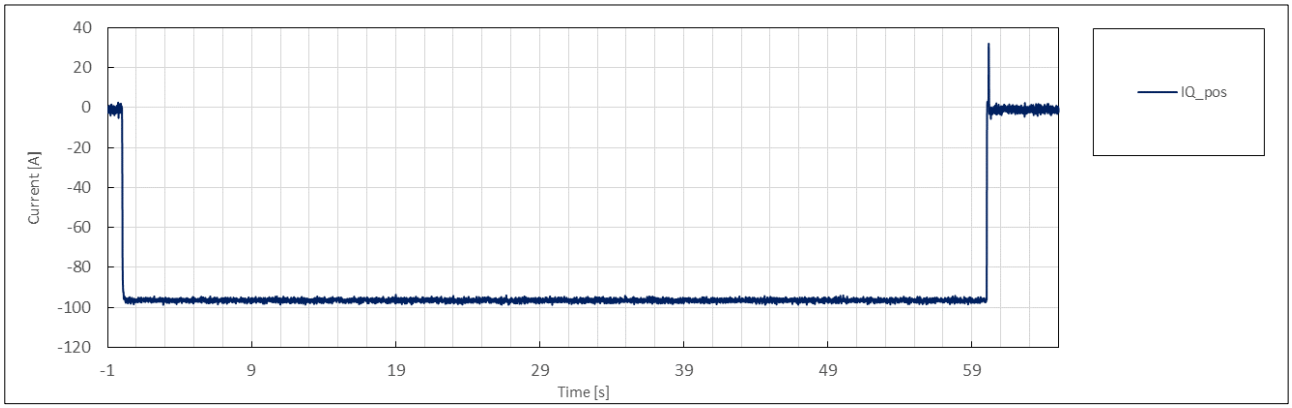


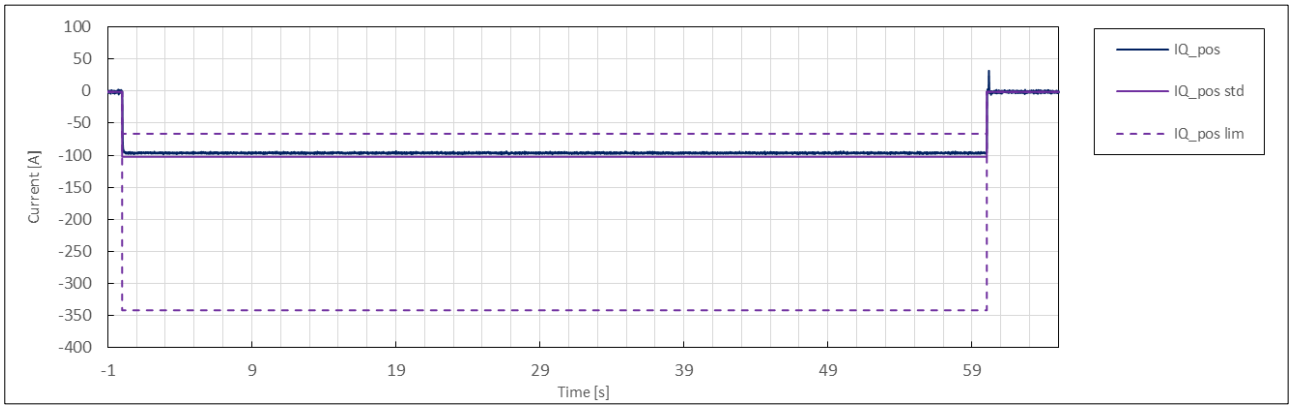

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
9
19
29
39
49
59
Time [s]
Ia
Ib
Ic

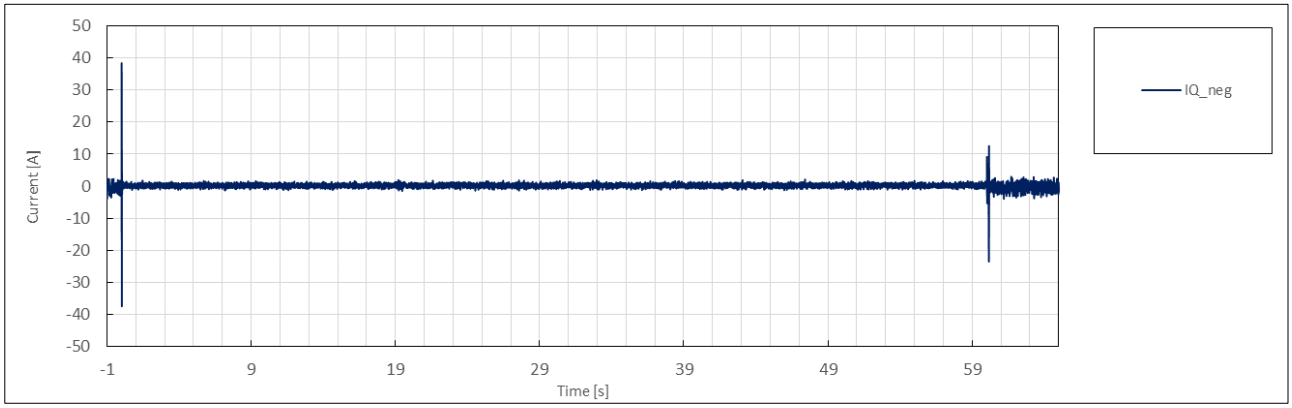

400
350
300
250
200
150
100
50
0
Current [A]
-1
9
19
29
39
49
59
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

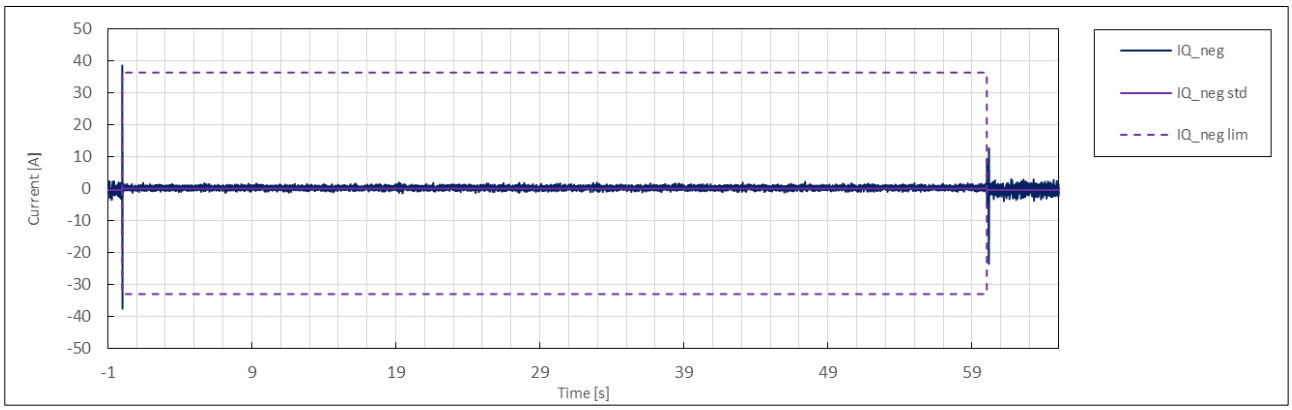

400
350
300
250
200
150
100
50
0
Current [A]
-1
9
19
29
39
49
59
Time [s]
IP_pos

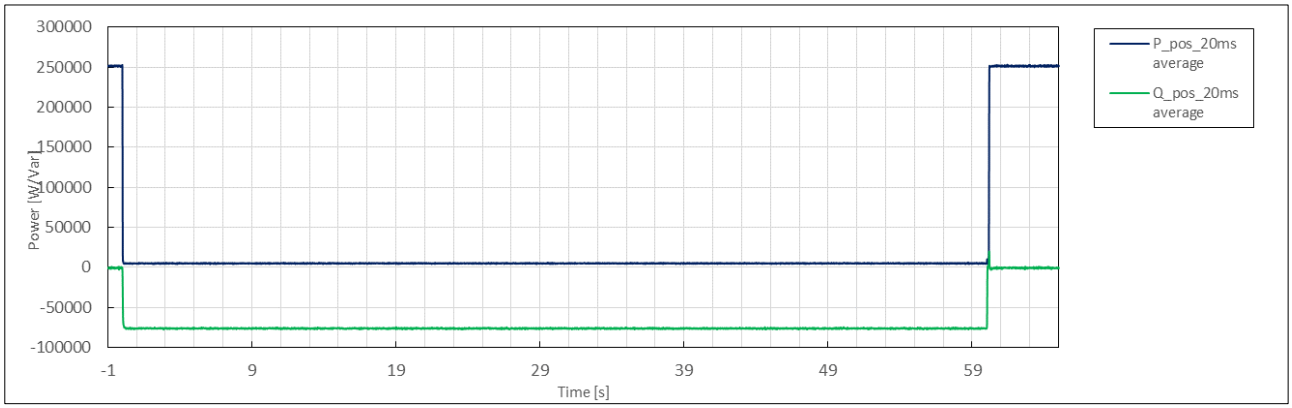

400
350
300
250
200
150
100
50
0
Current [A]
-1
9
19
29
39
49
59
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

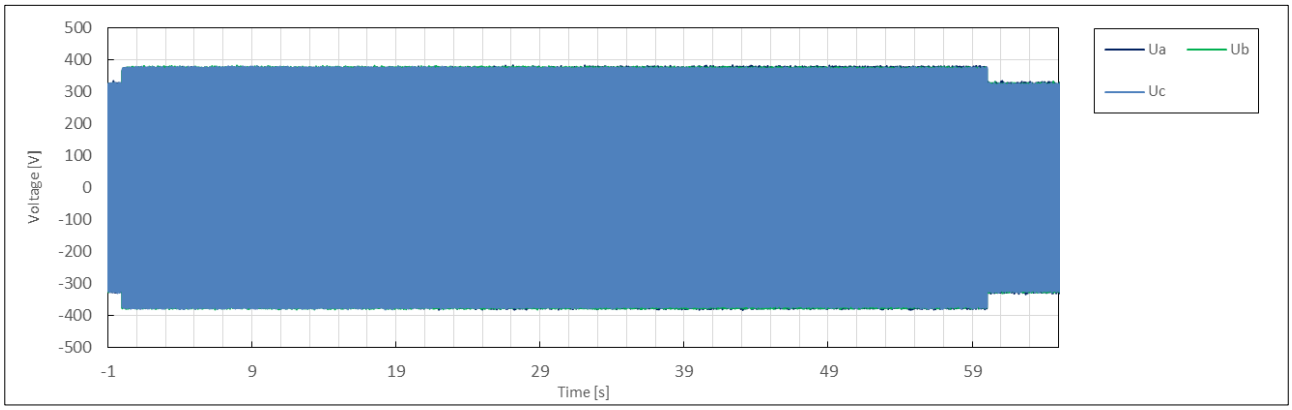

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

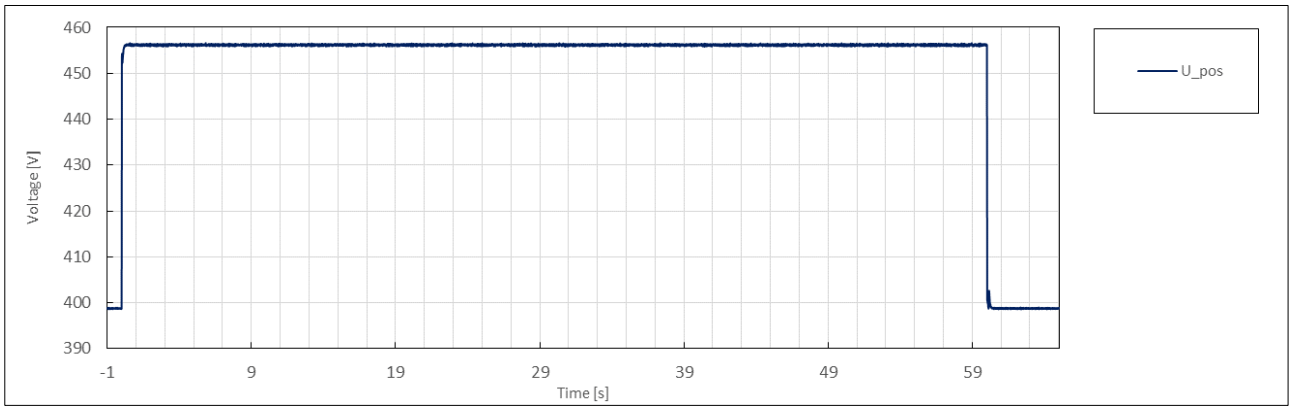

Current [A]
Time [s]
IQ_neg

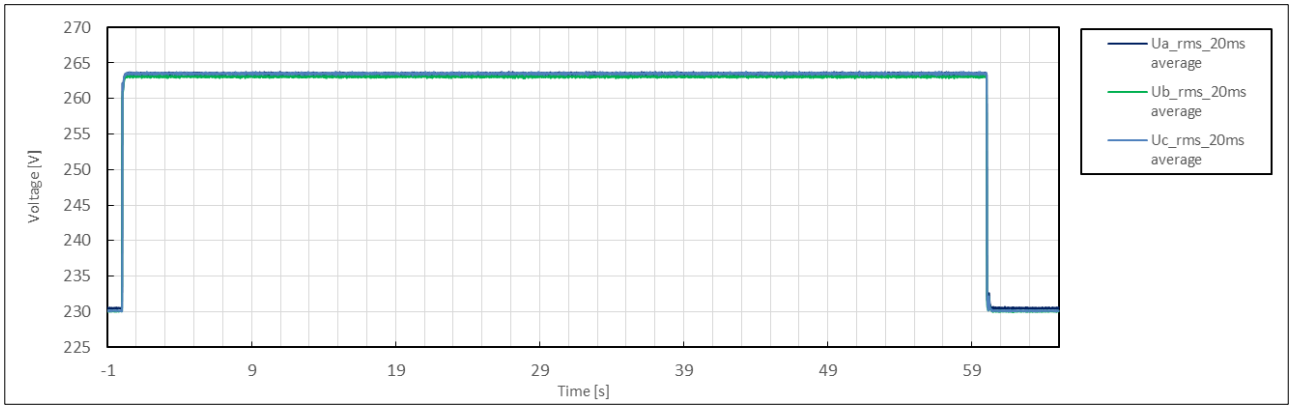

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
Power [W/Var]
-1
9
19
29
39
49
59
Time [s]
P_pos_20ms average
Q_pos_20ms average

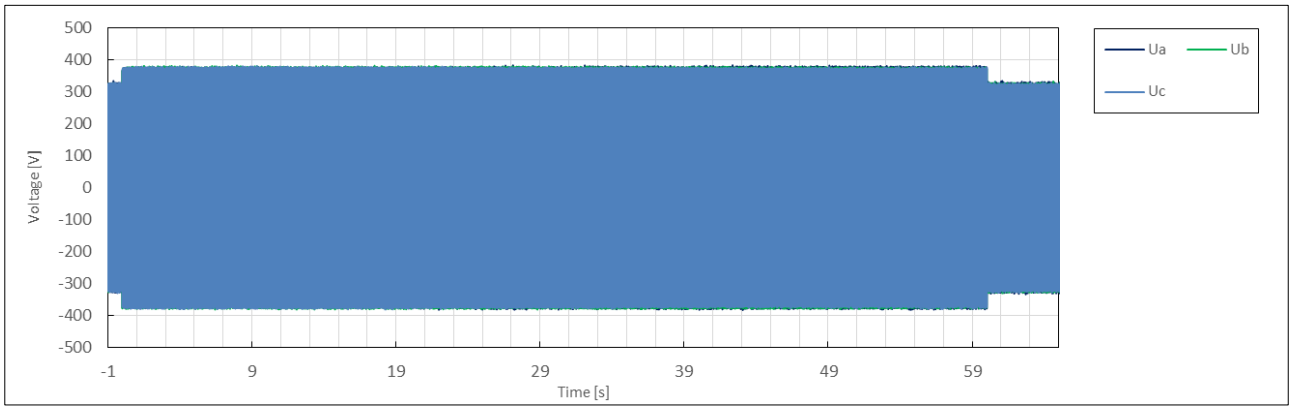
No. 6.2 Idle Test

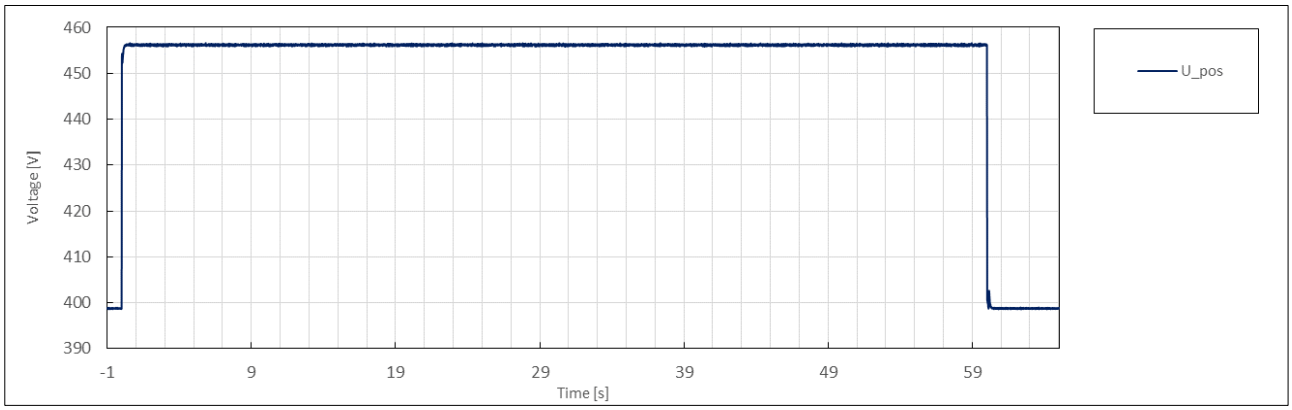


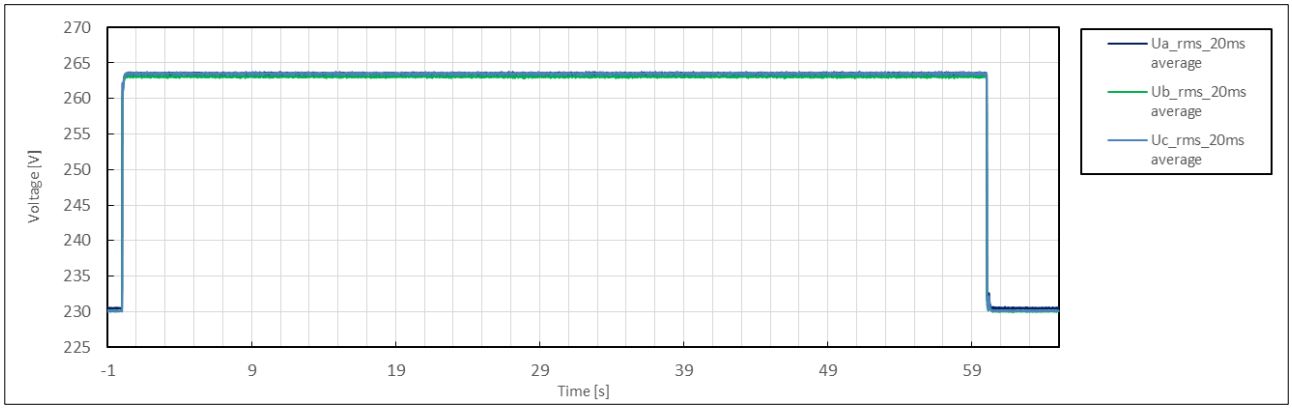


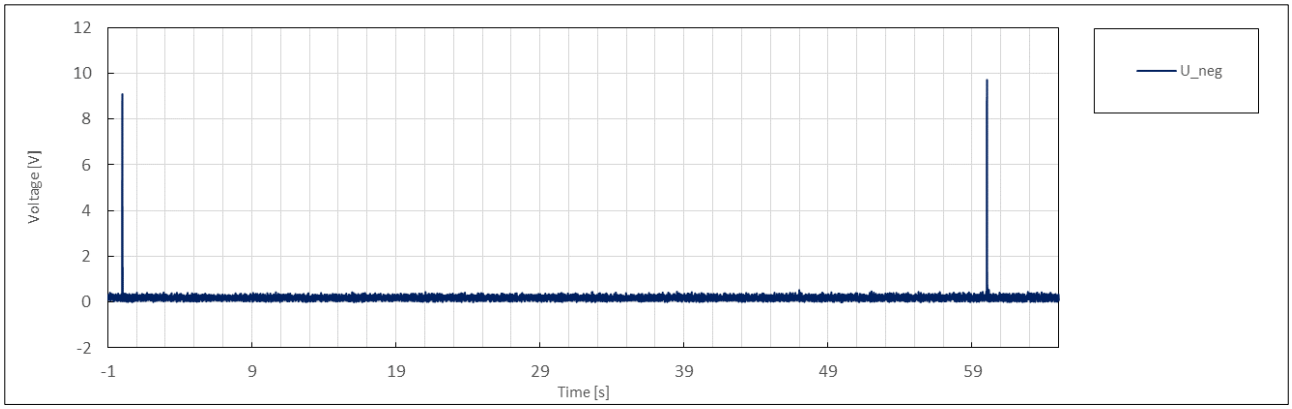


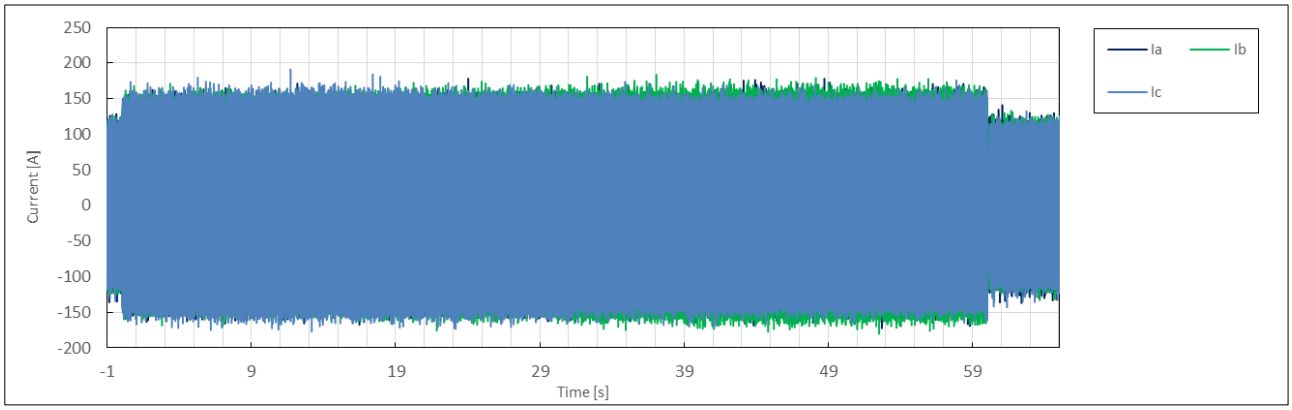
No. 6.2 Load Test

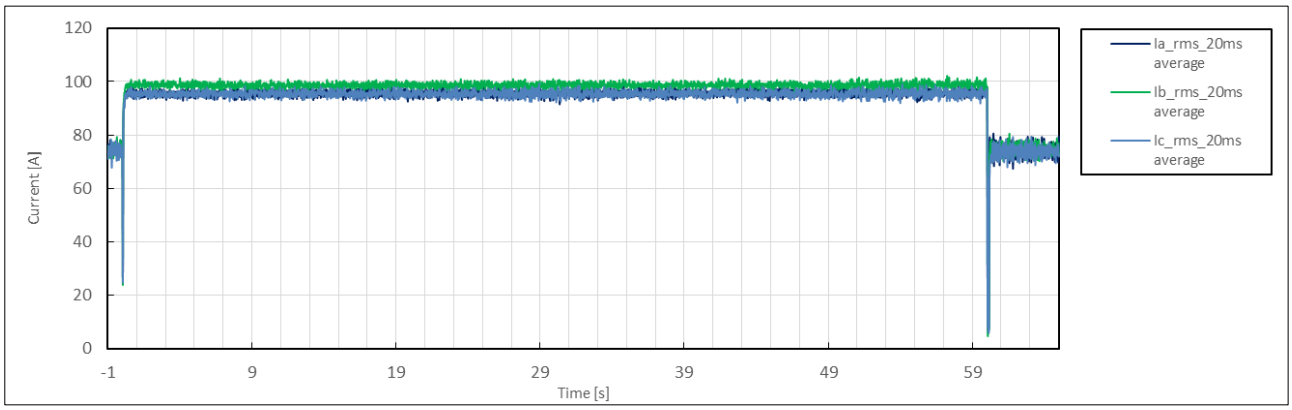


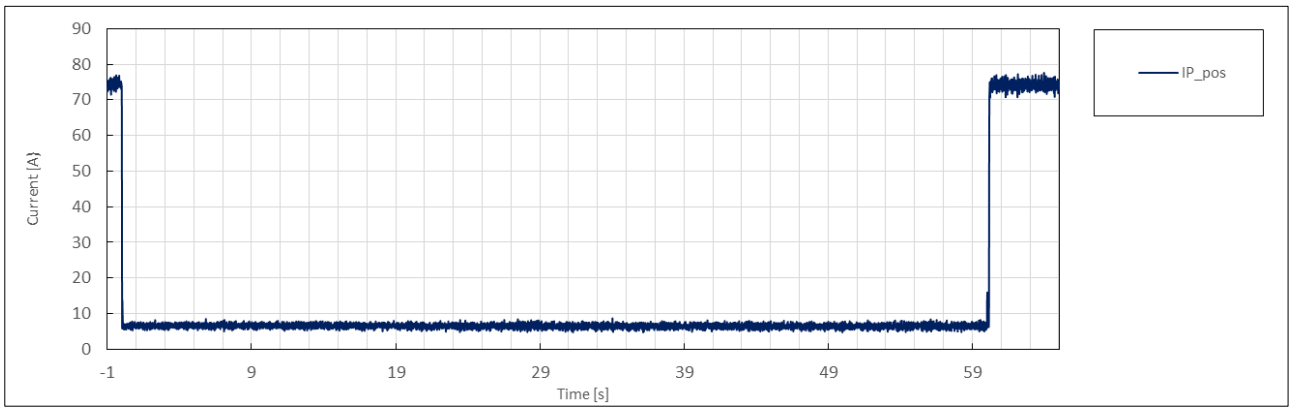


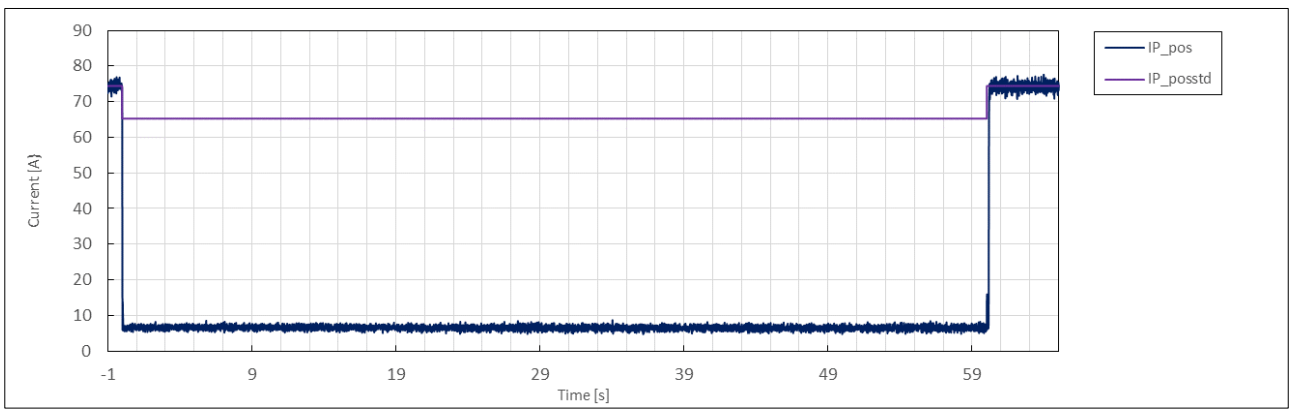


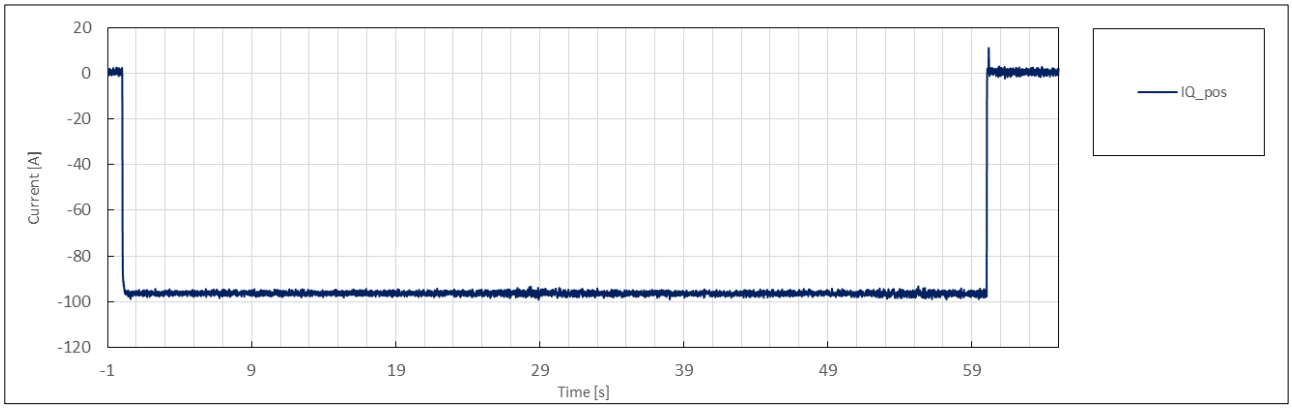


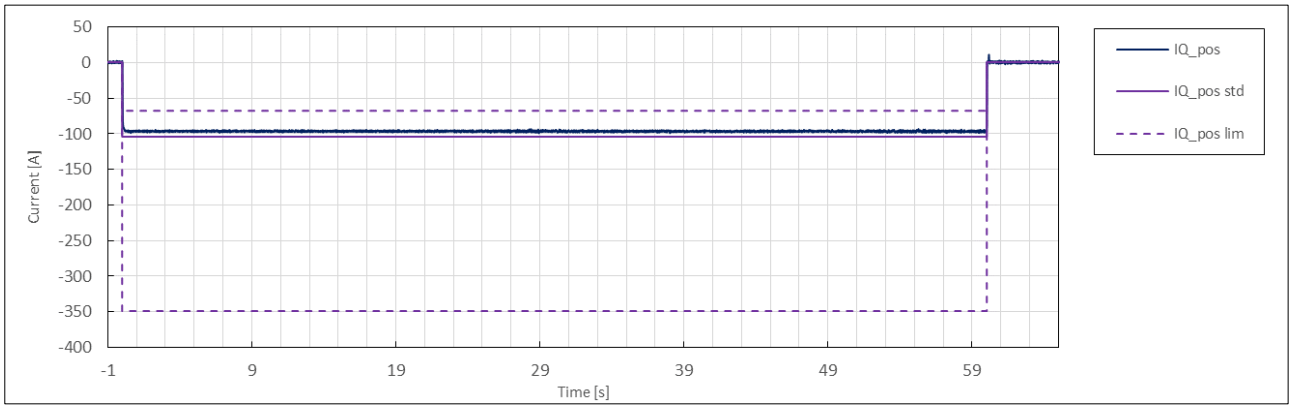

Current [A]
Time [s]
Ia
Ib
Ic

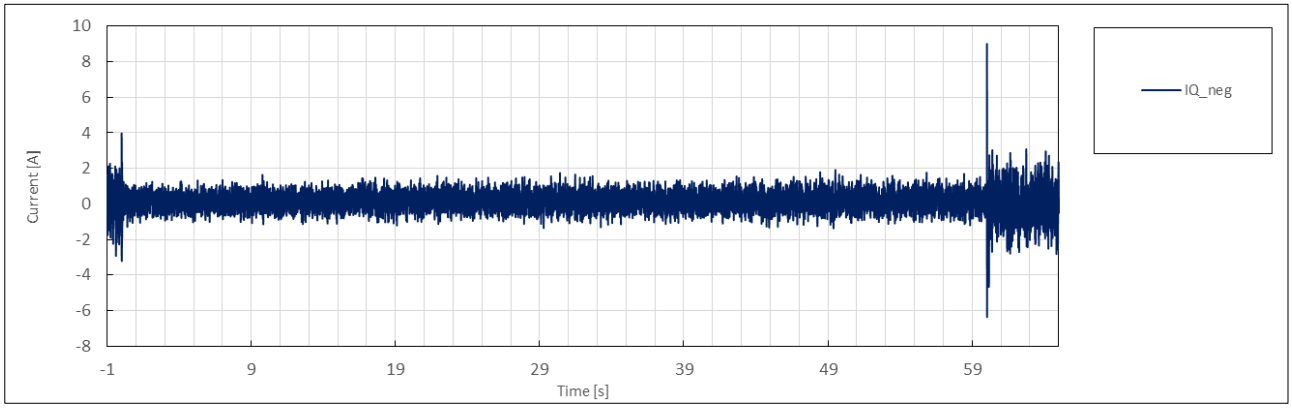

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

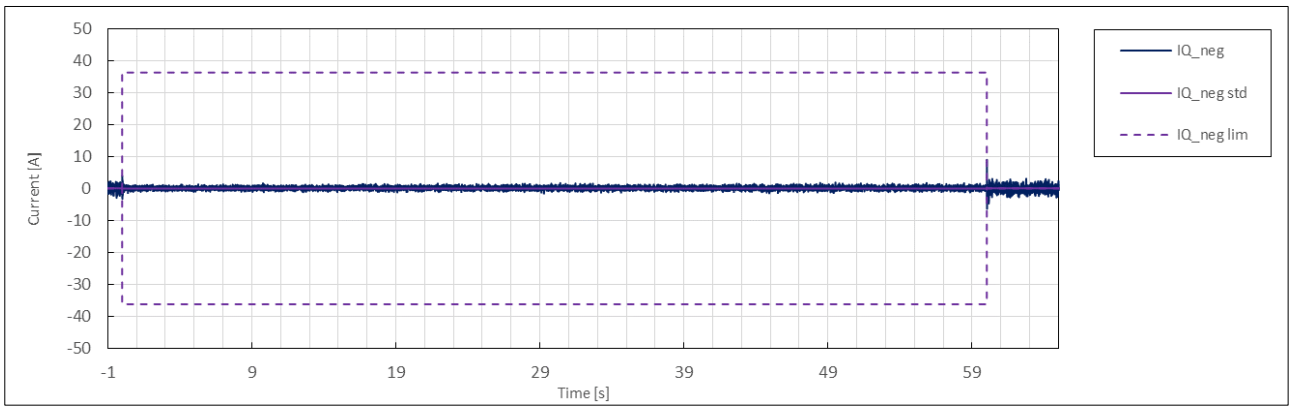

Current [A]
Time [s]
IP_pos

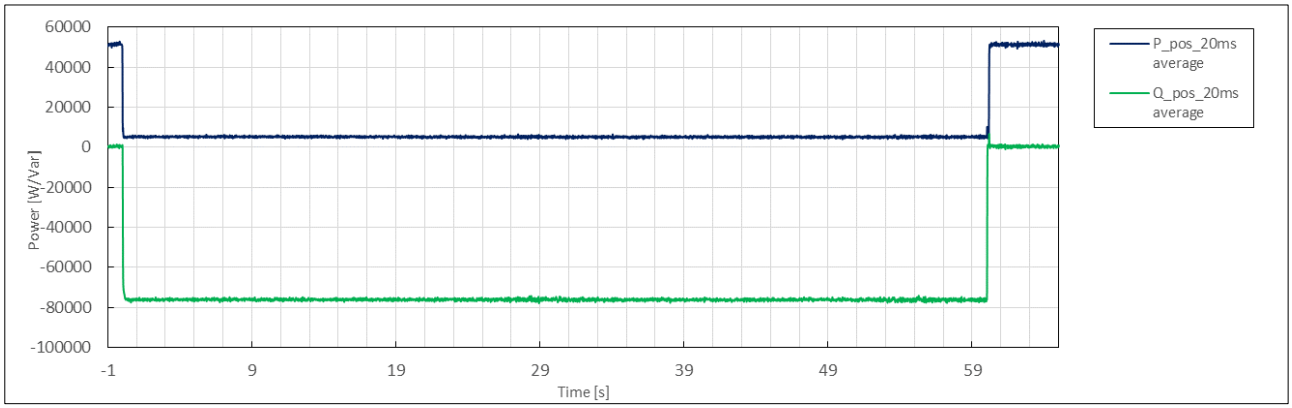

Current [A]
Time [s]
IP_pos
IP_posstd


20
0
-20
-40
-60
-80
-100
-120
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos

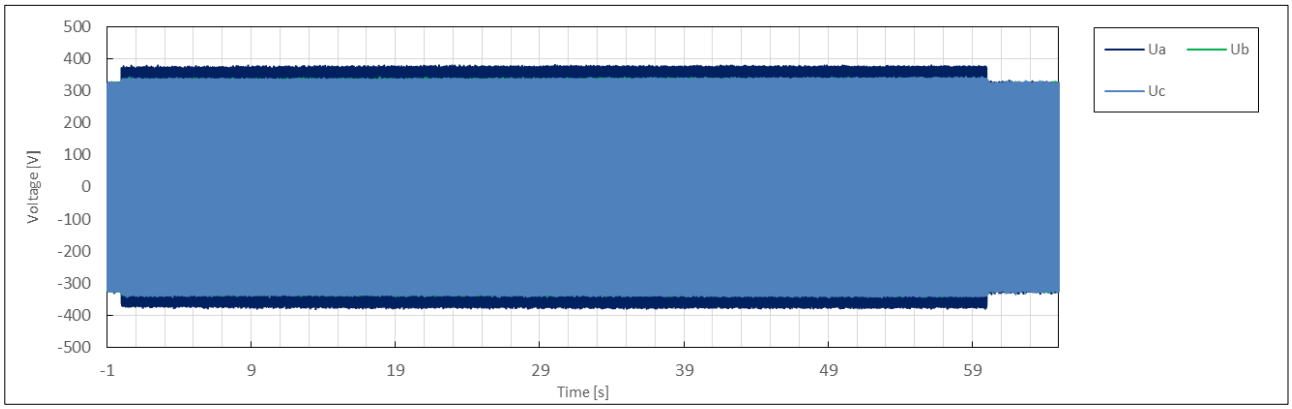

50
0
-50
-100
-150
-200
-250
-300
-350
-400
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

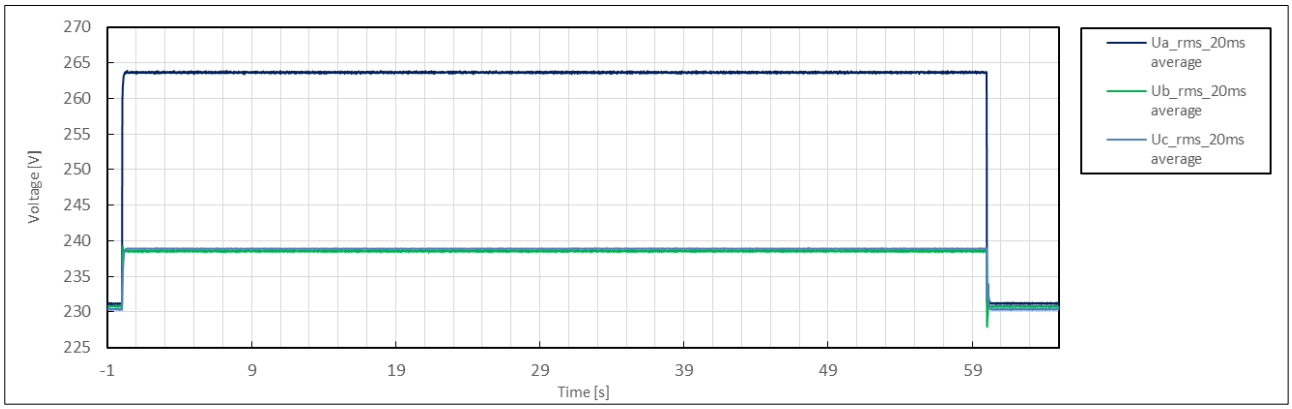

10
8
6
4
2
0
-2
-4
-6
-8
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg

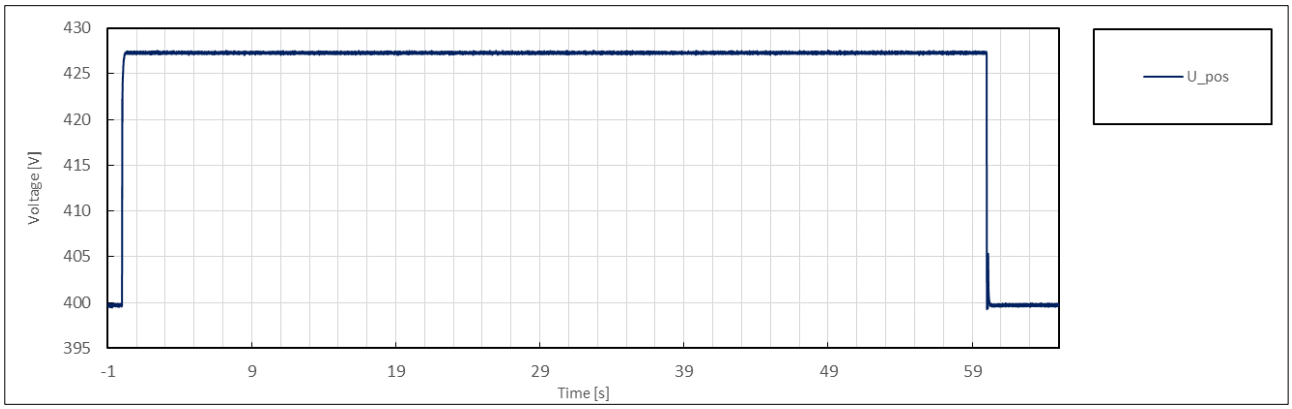

50
40
30
20
10
0
-10
-20
-30
-40
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


60000
40000
20000
0
-20000
-40000
-60000
-80000
-100000
Power [W/Var]
-1
9
19
29
39
49
59
Time [s]
P_pos_20ms average
Q_pos_20ms average

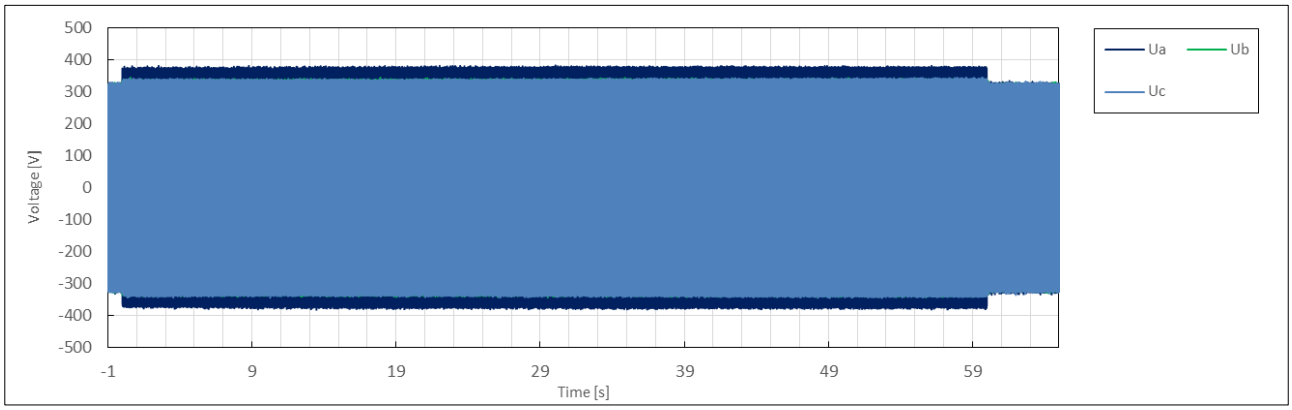
No. 6.3 Idle Test

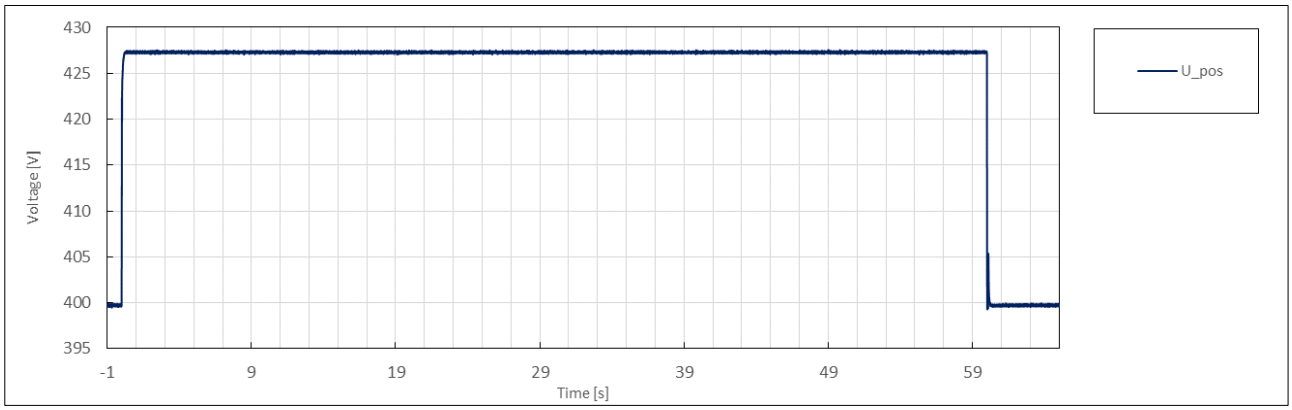


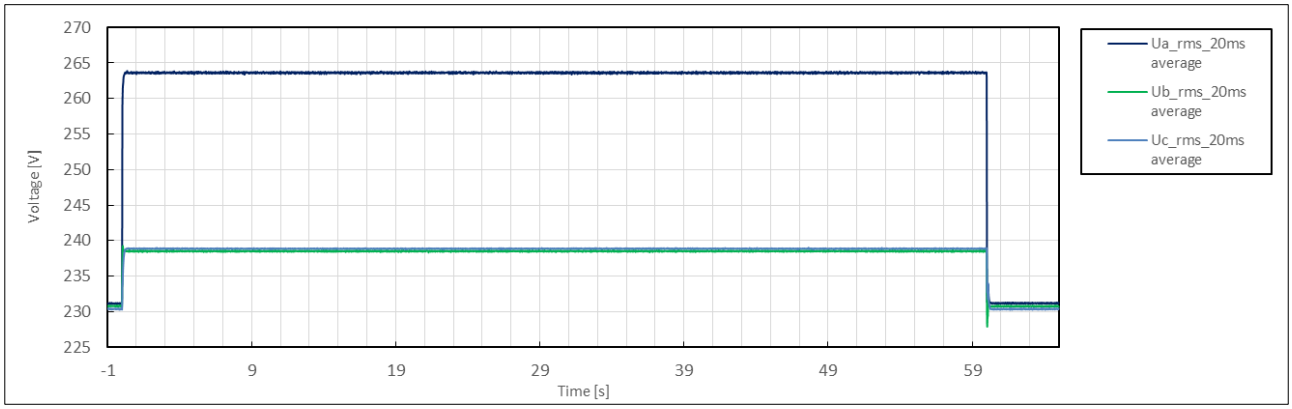


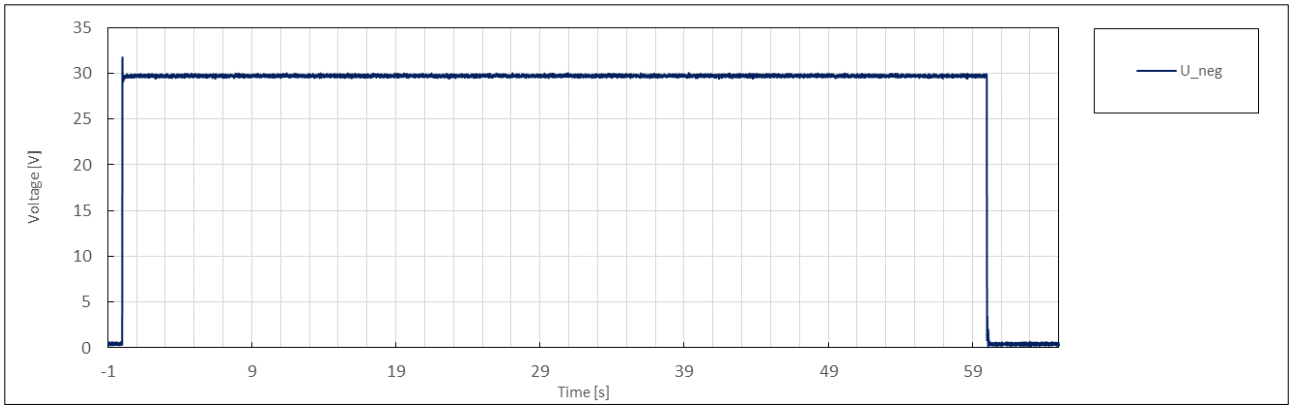


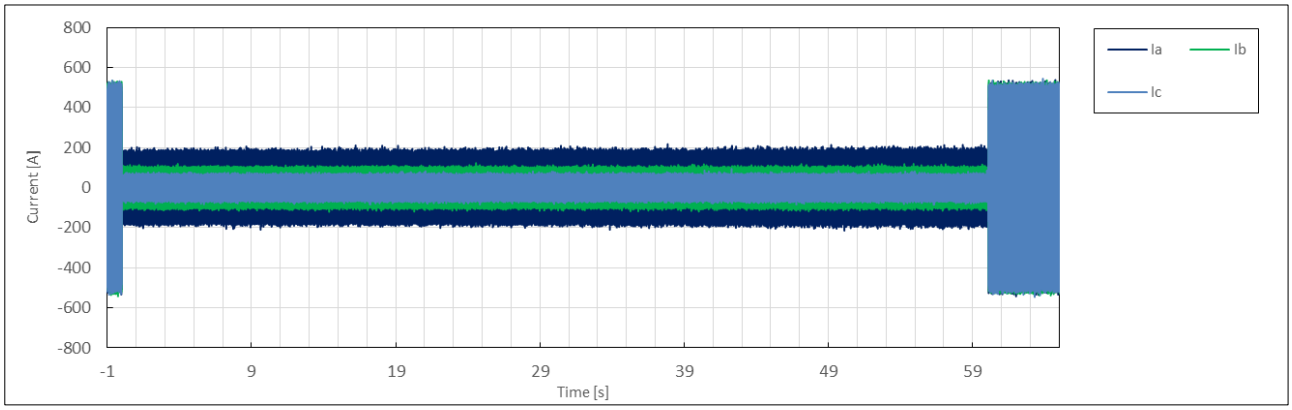
No. 6.3 Load Test

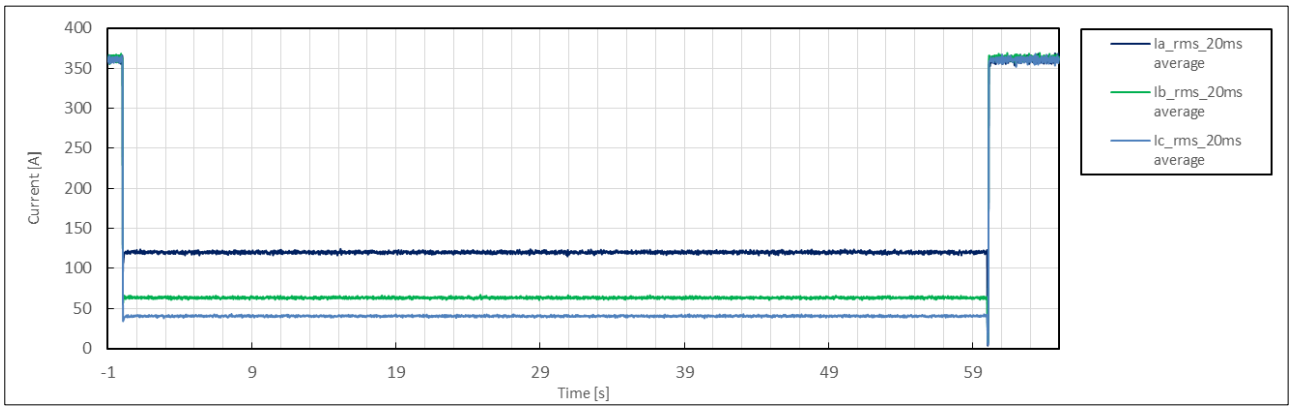


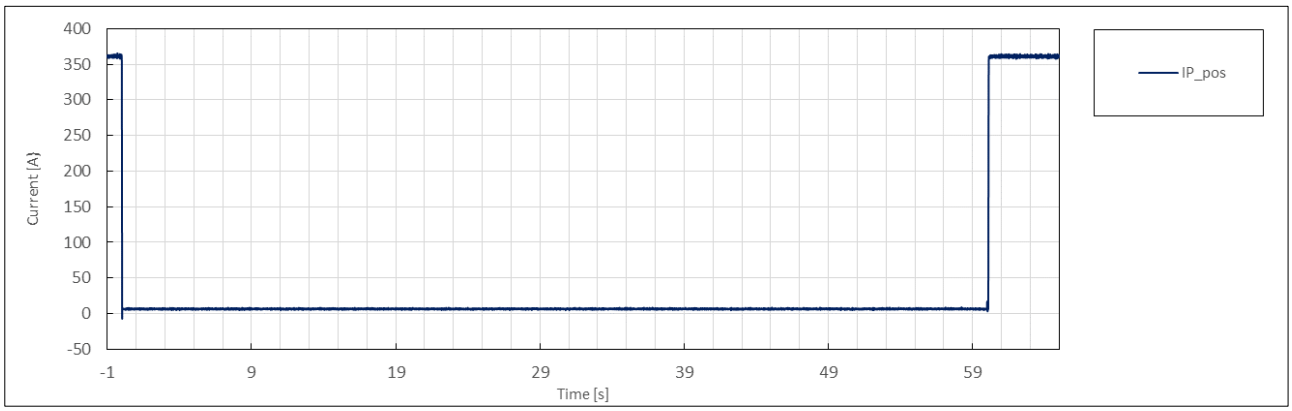


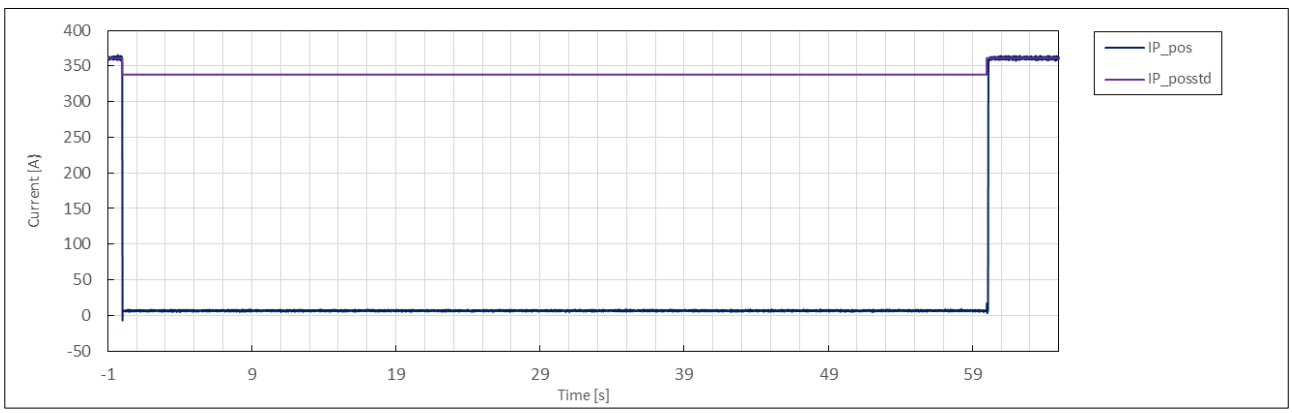


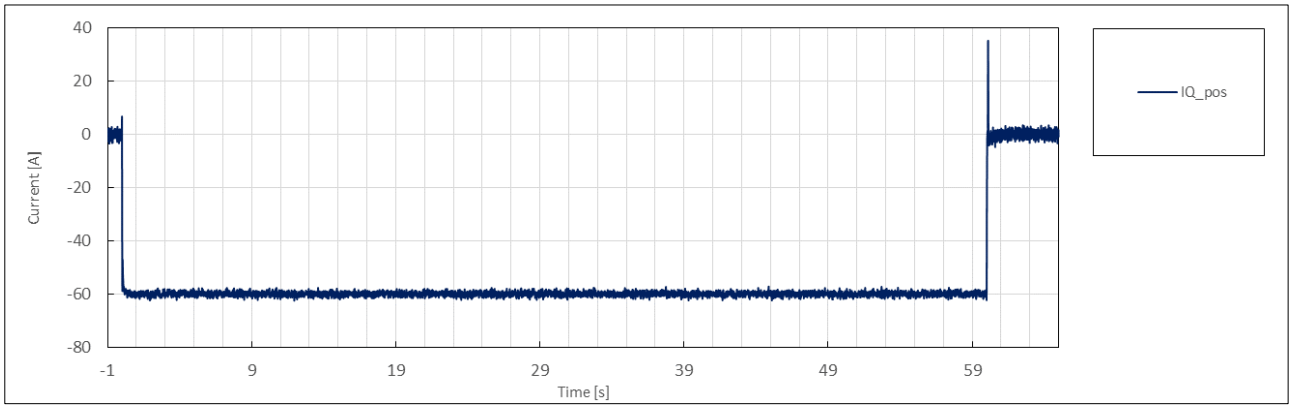


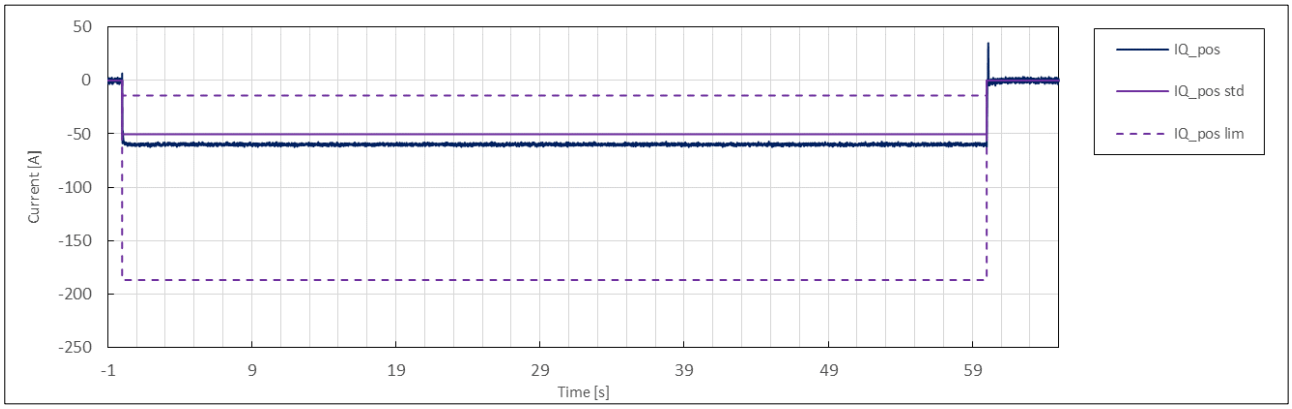

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
9
19
29
39
49
59
Time [s]
Ia
Ib
Ic

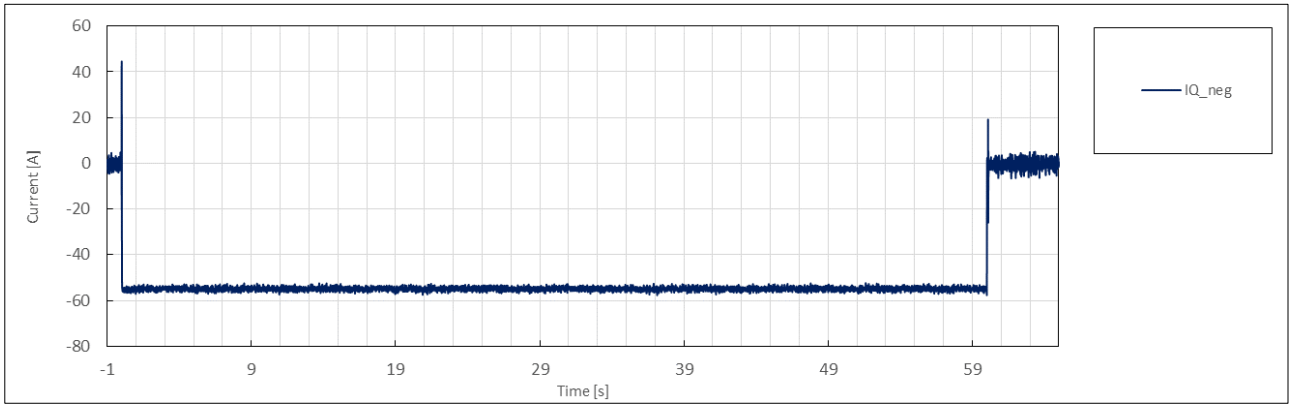

400
350
300
250
200
150
100
50
0
Current [A]
-1
9
19
29
39
49
59
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

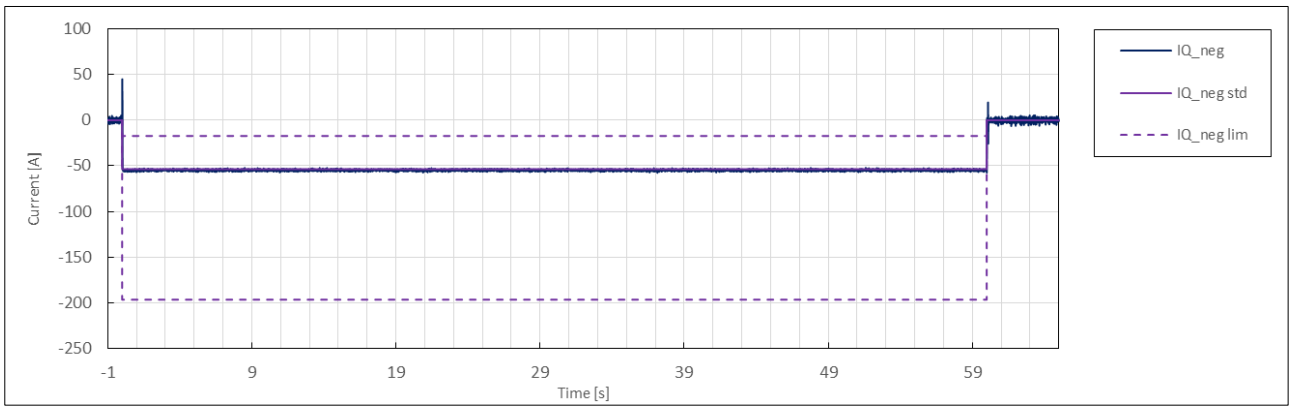

400
350
300
250
200
150
100
50
0
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IP_pos

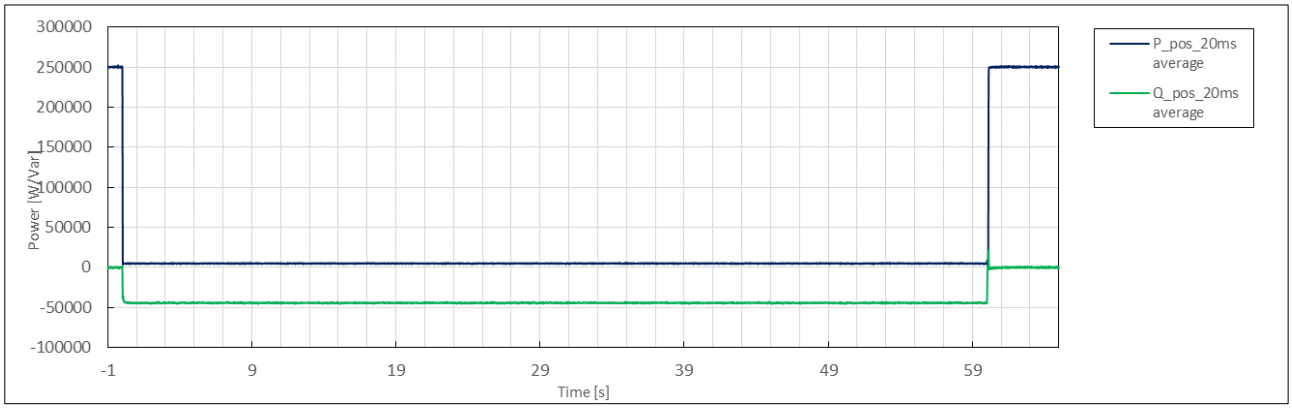

400
350
300
250
200
150
100
50
0
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IP_pos
IP_posstd


40
20
0
-20
-40
-60
-80
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos

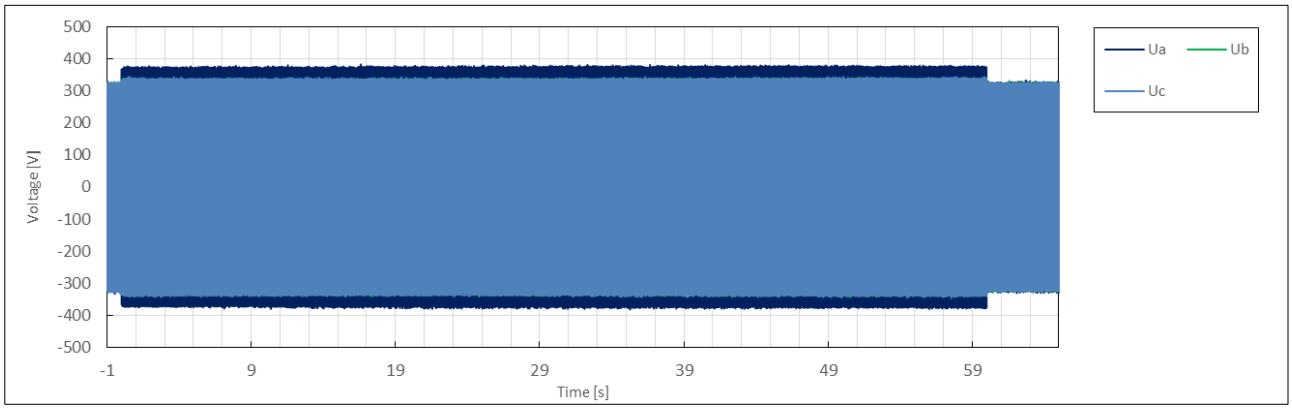

50
0
-50
-100
-150
-200
-250
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

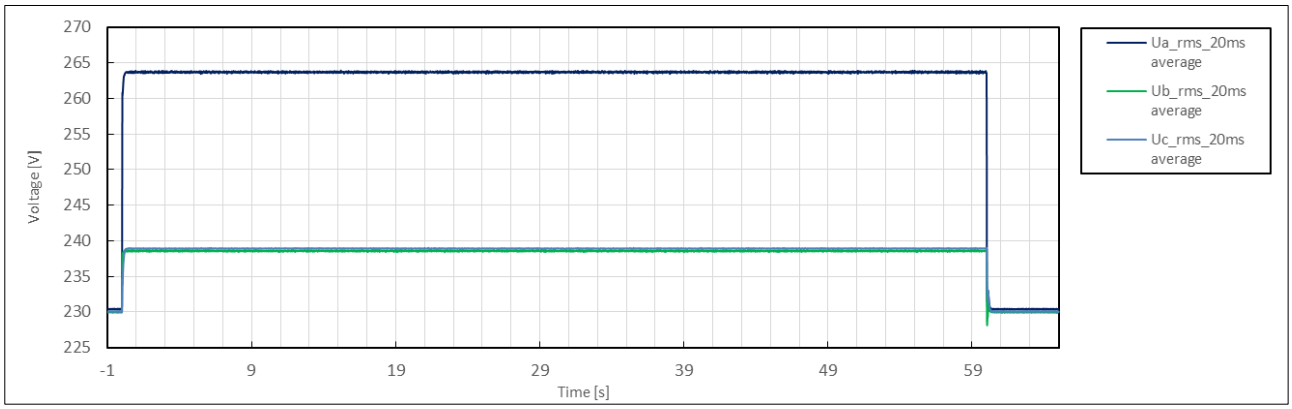

60
40
20
0
-20
-40
-60
-80
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg

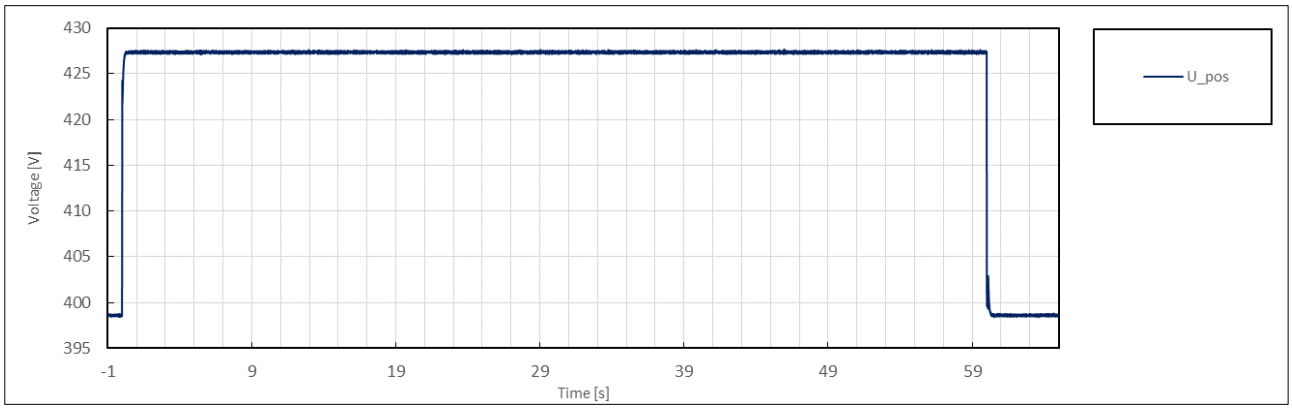

100
50
0
-50
-100
-150
-200
-250
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
Power [W/Var]
-1
9
19
29
39
49
59
Time [s]
P_pos_20ms average
Q_pos_20ms average

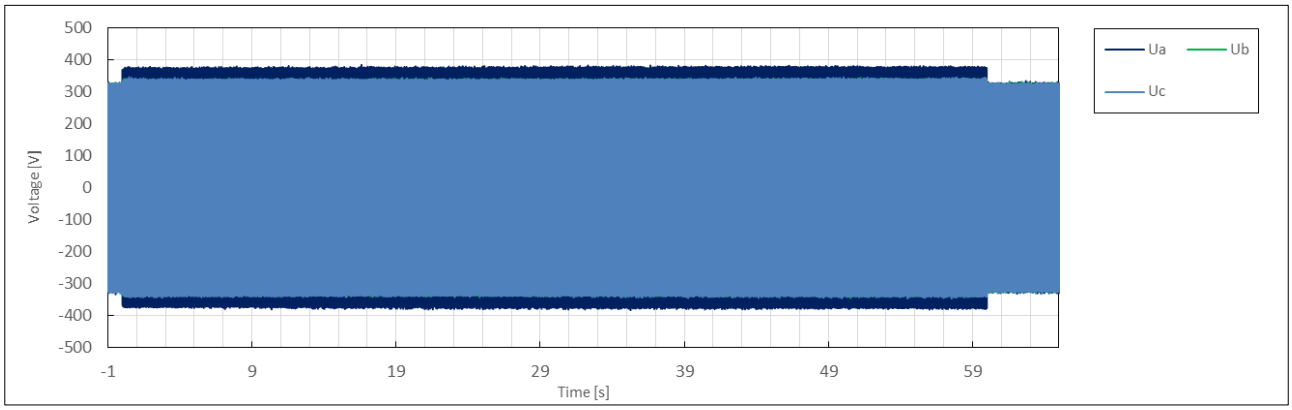
No. 6.4 Idle Test

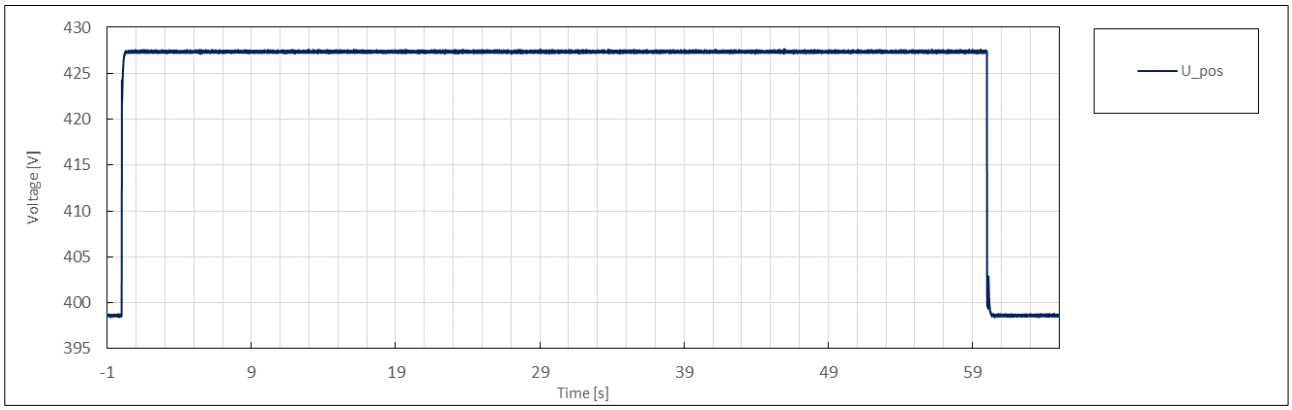


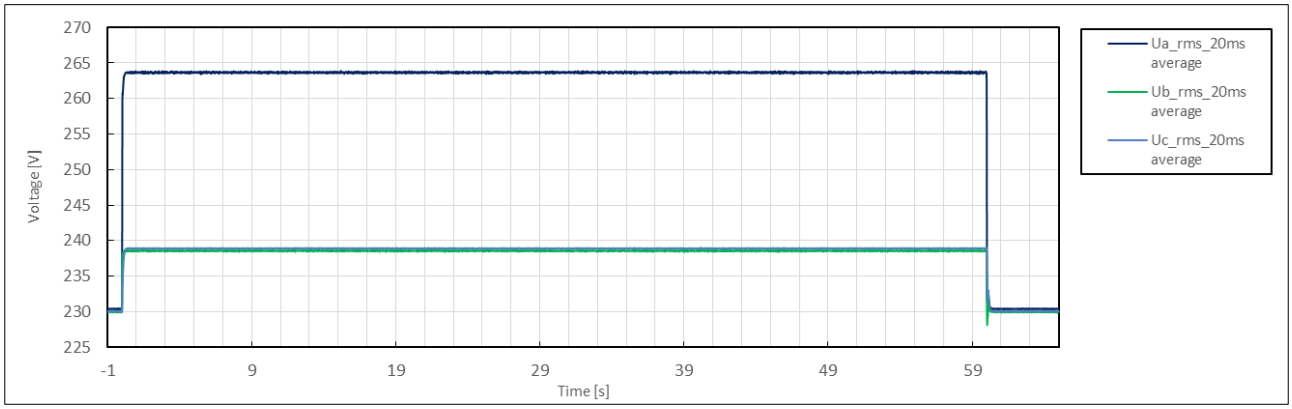


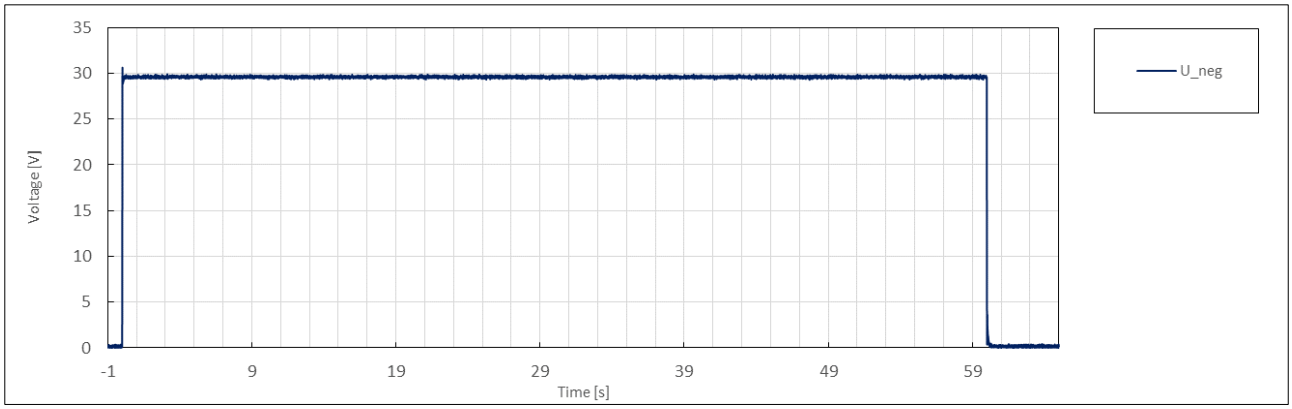


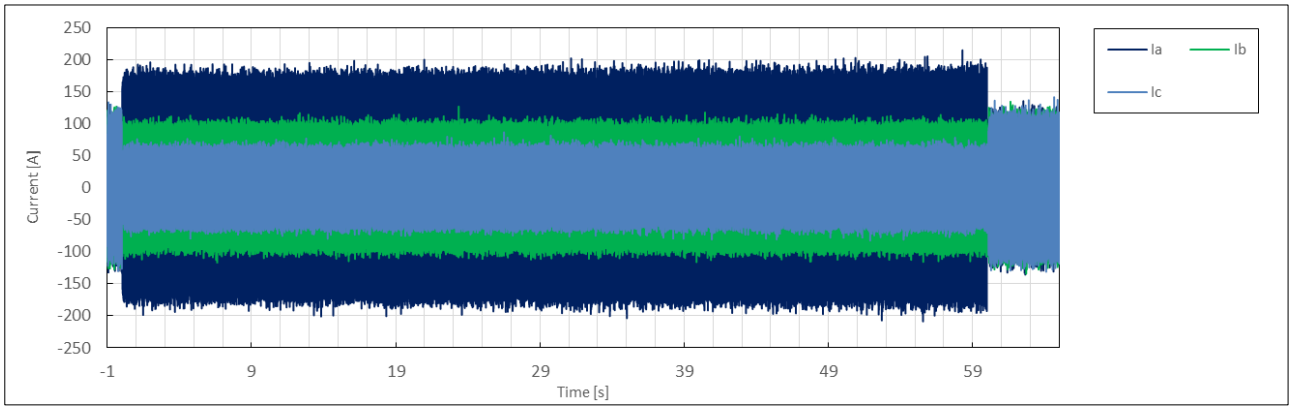
No. 6.4 Load Test

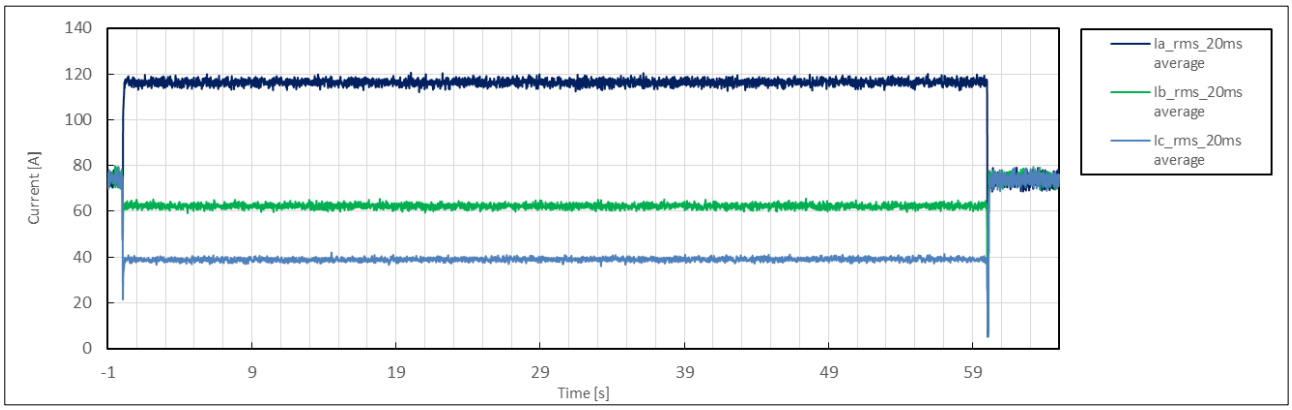


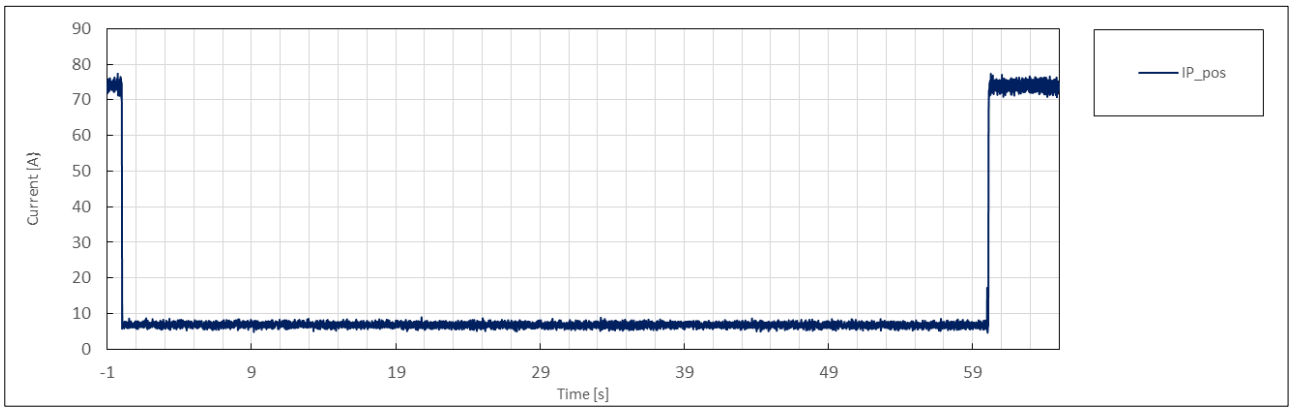


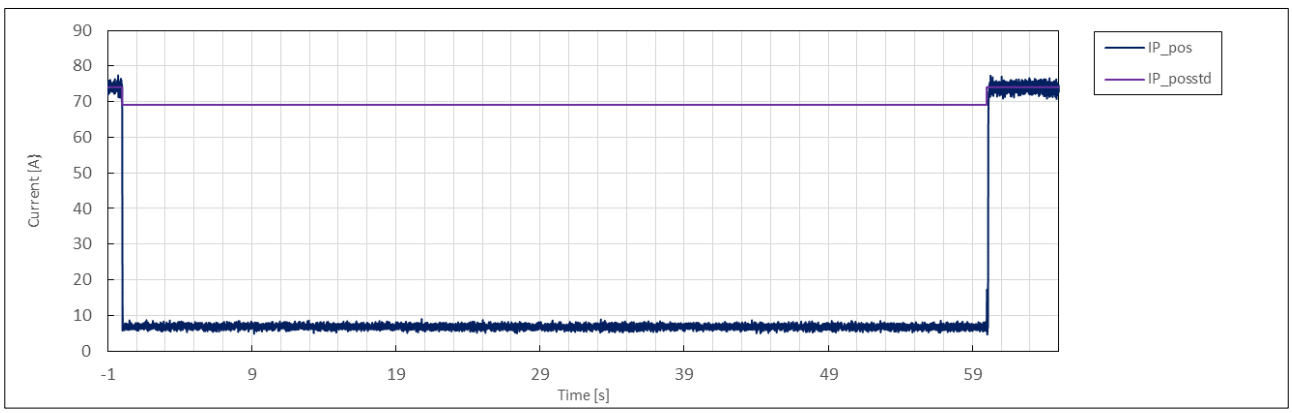


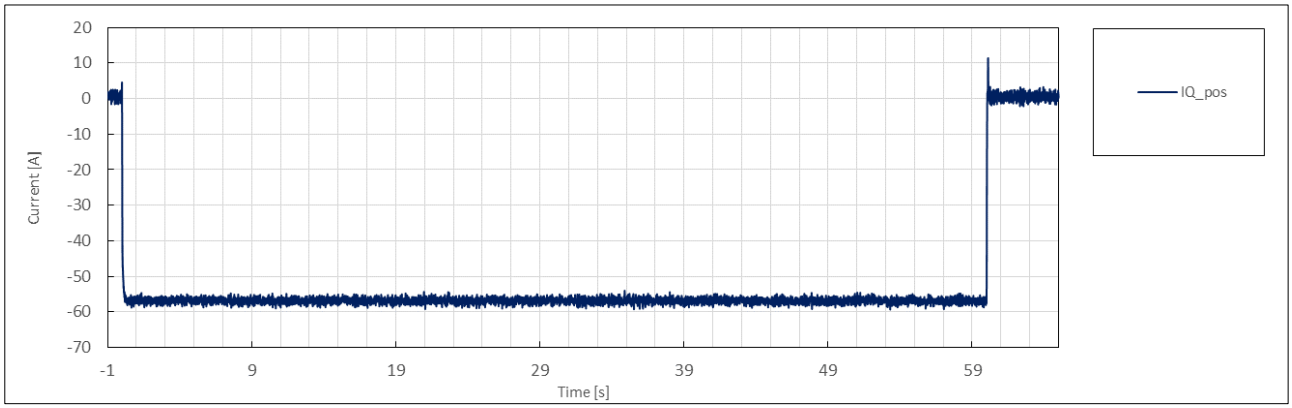


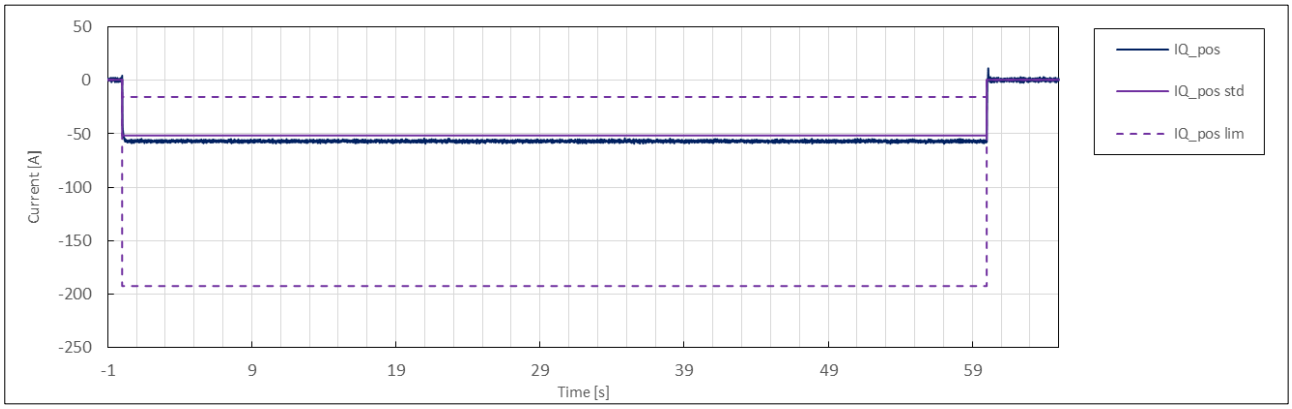

Current [A]
Time [s]
Ia
Ib
Ic

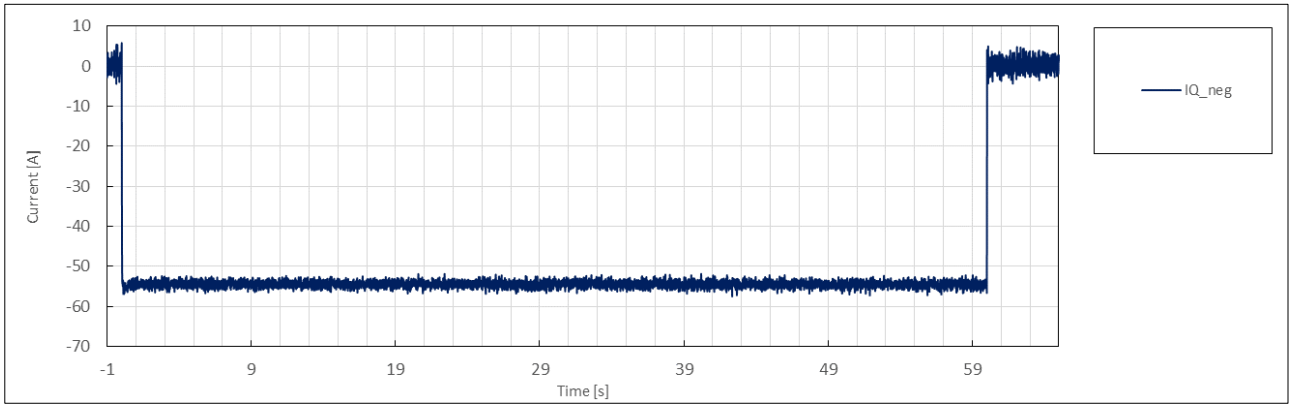

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

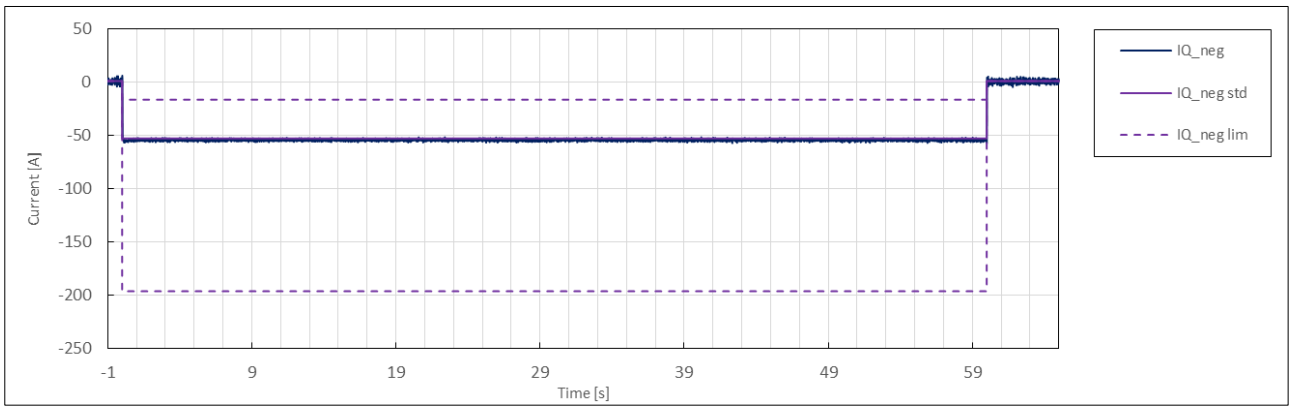

Current [A]
Time [s]
IP_pos

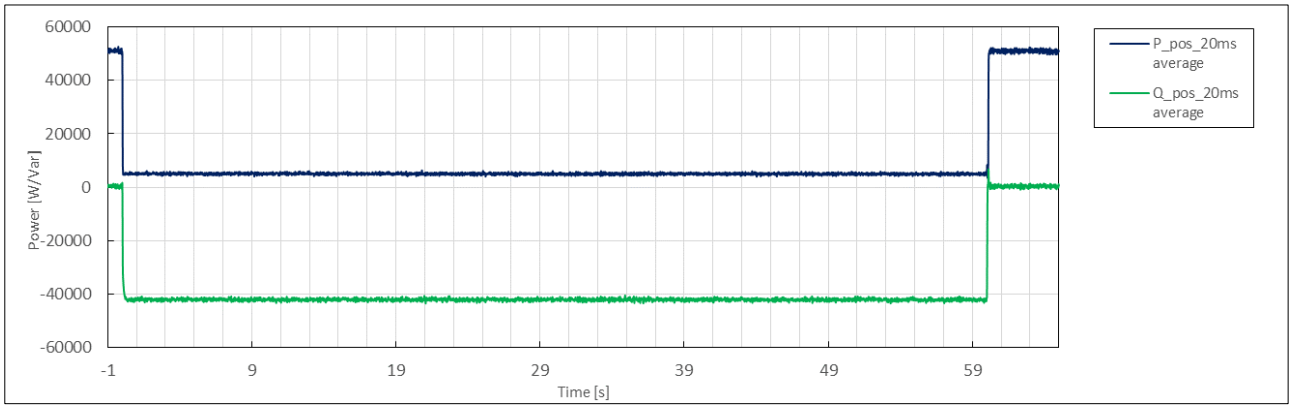

Current [A]
Time [s]
IP_pos
IP_posstd


20
10
0
-10
-20
-30
-40
-50
-60
-70
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos

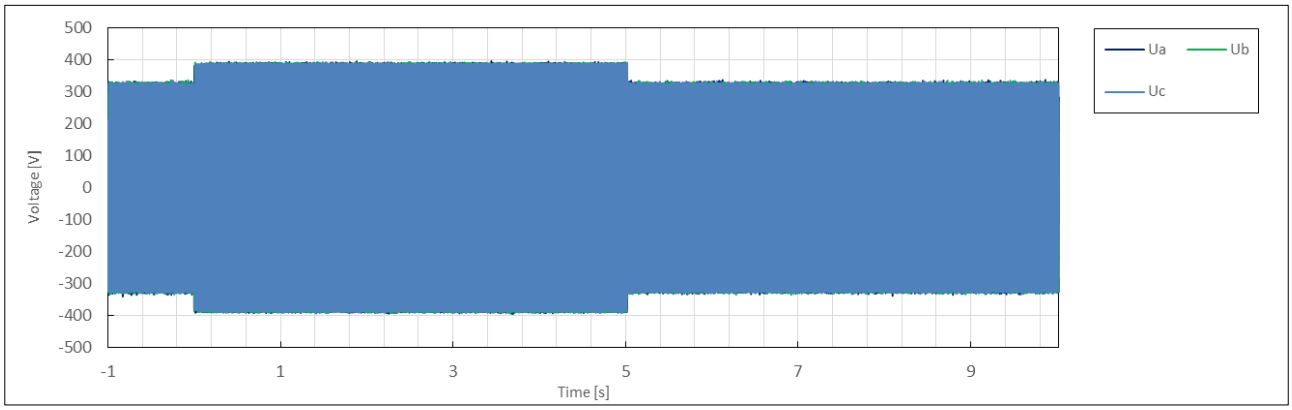

50
0
-50
-100
-150
-200
-250
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

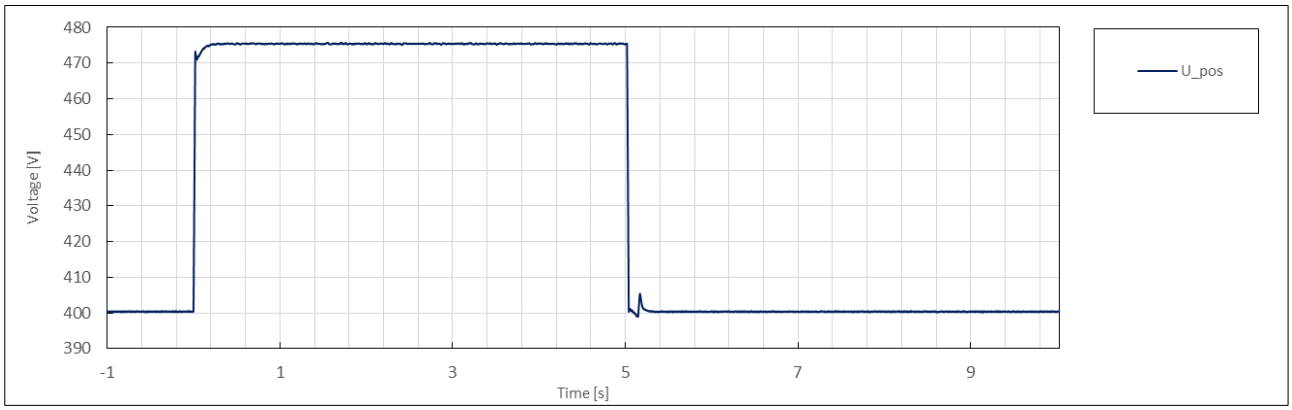

10
0
-10
-20
-30
-40
-50
-60
-70
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg

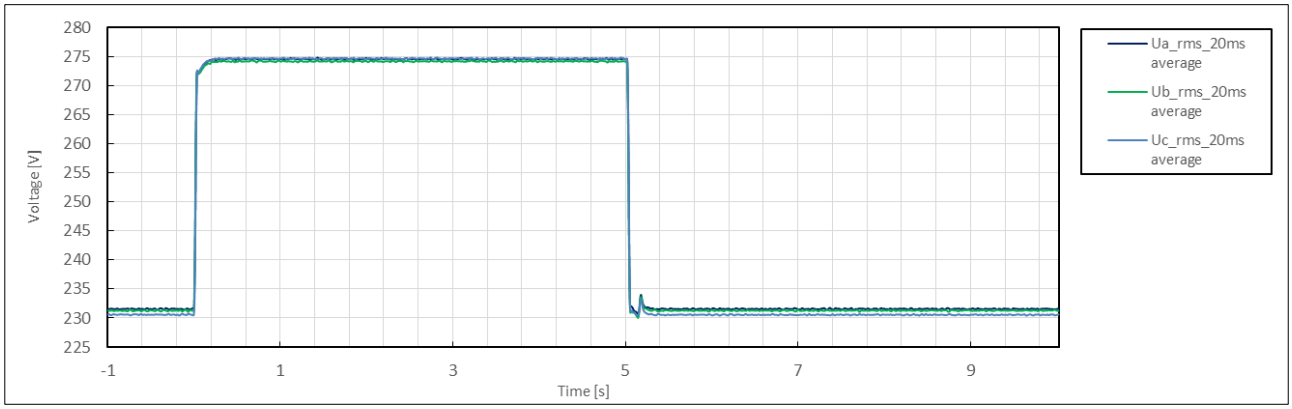

50
0
-50
-100
-150
-200
-250
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


60000
40000
20000
0
-20000
-40000
-60000
Power [W/Var]
-1
9
19
29
39
49
59
Time [s]
P_pos_20ms average
Q_pos_20ms average

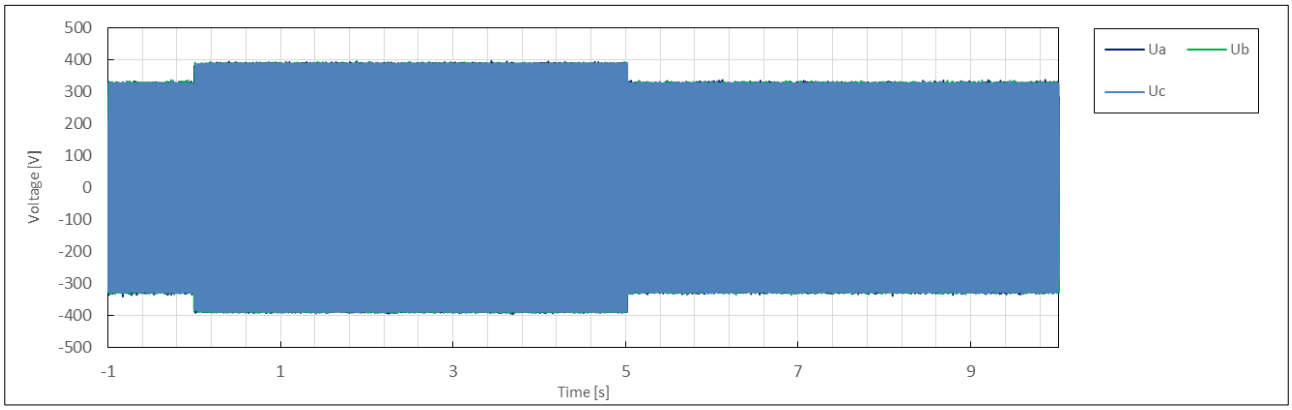
No. 7.1 Idle Test

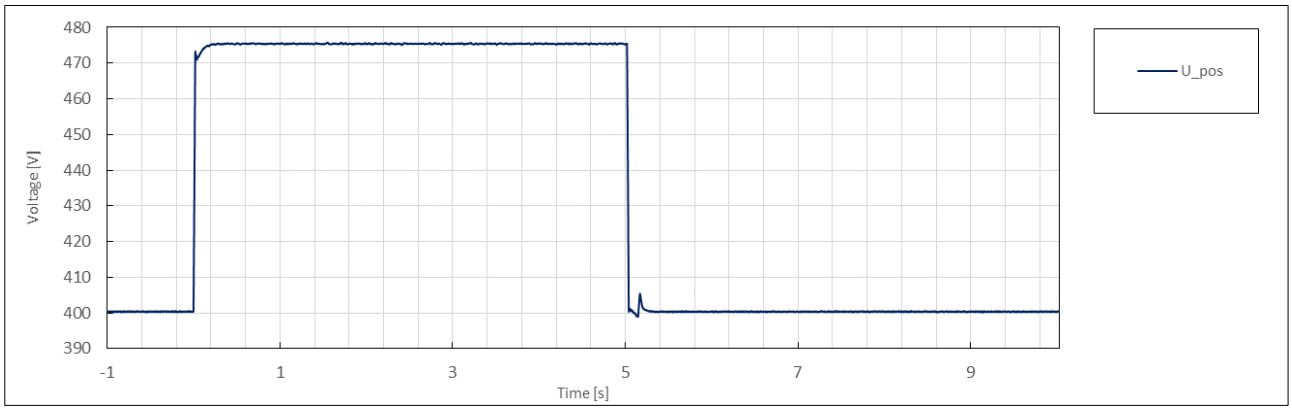


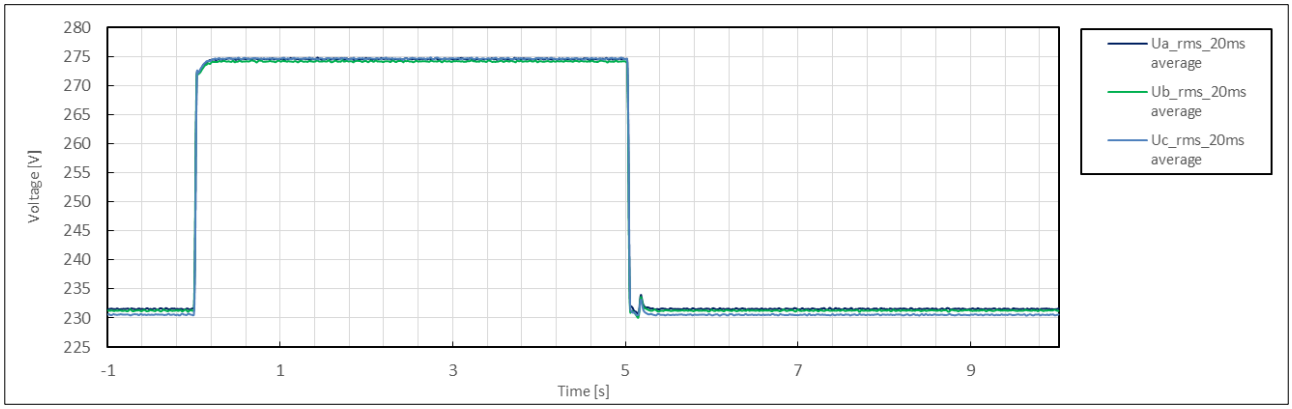


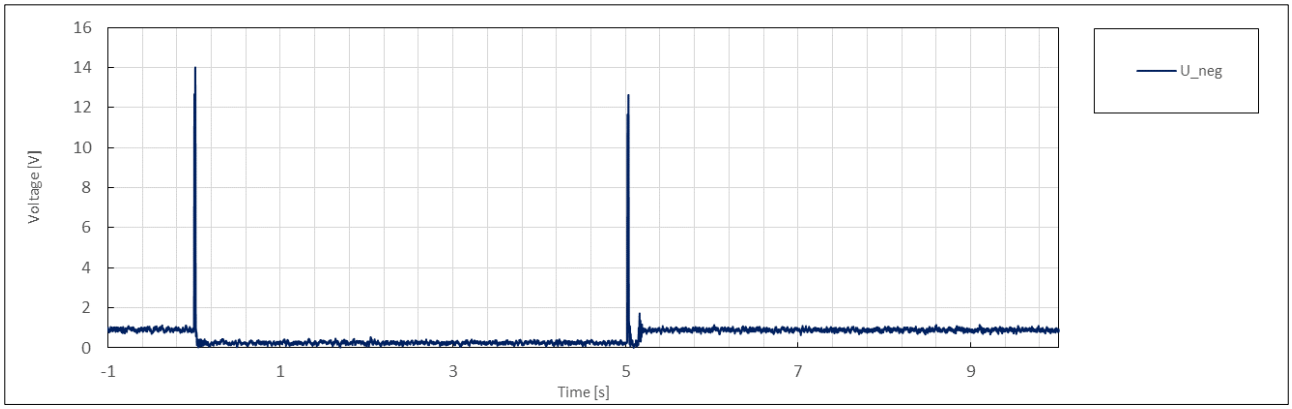


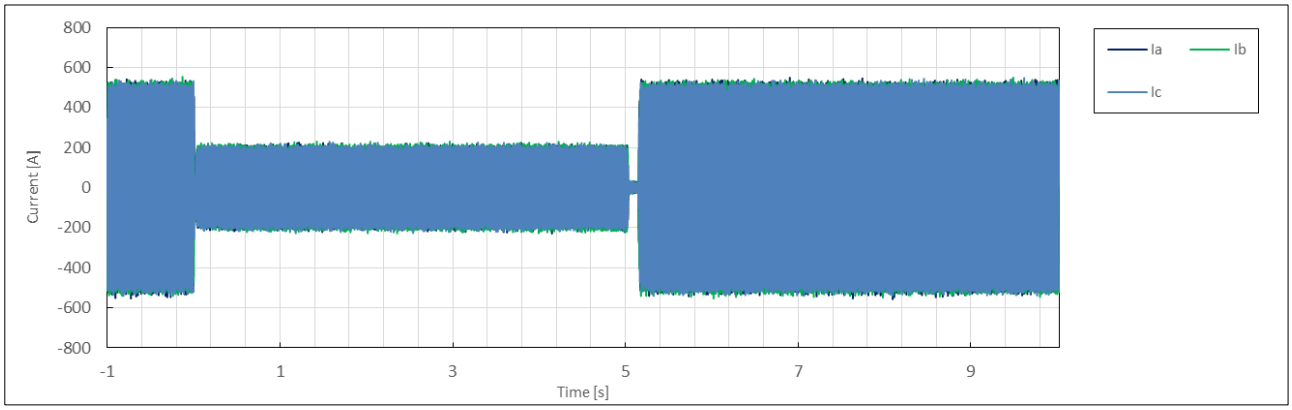
No. 7.1 Load Test

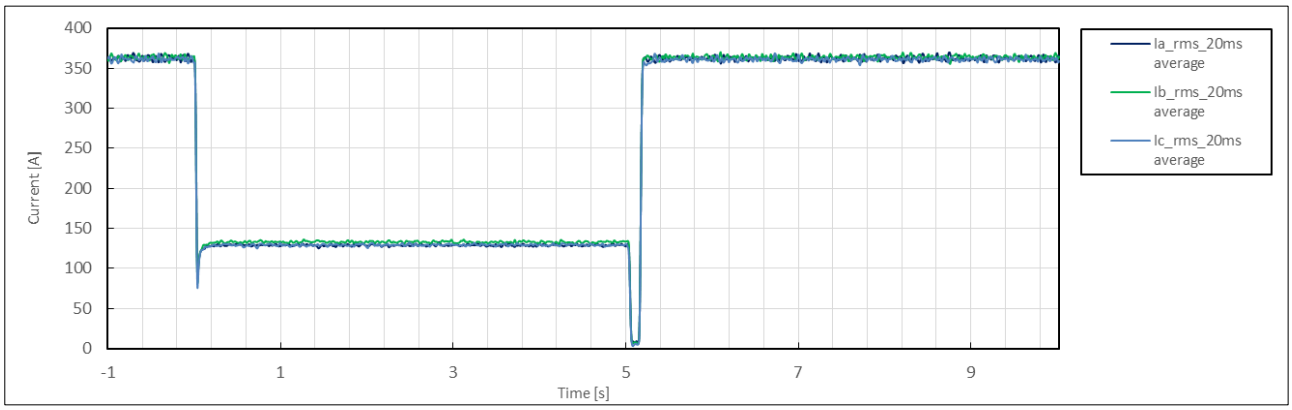


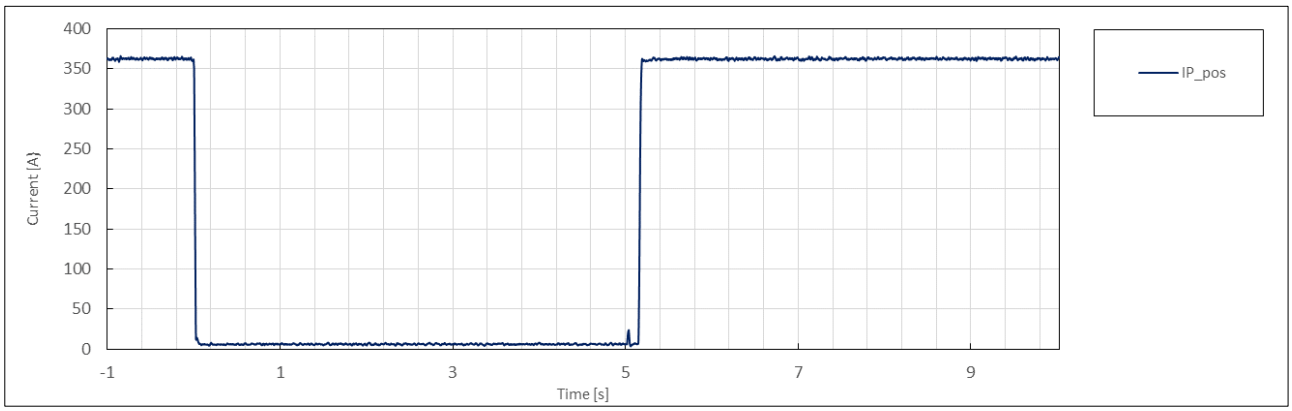


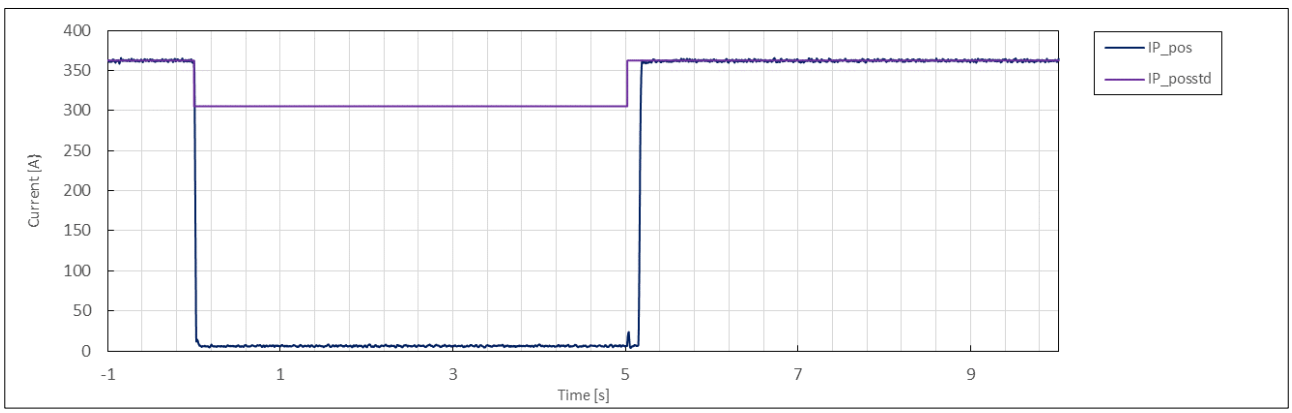


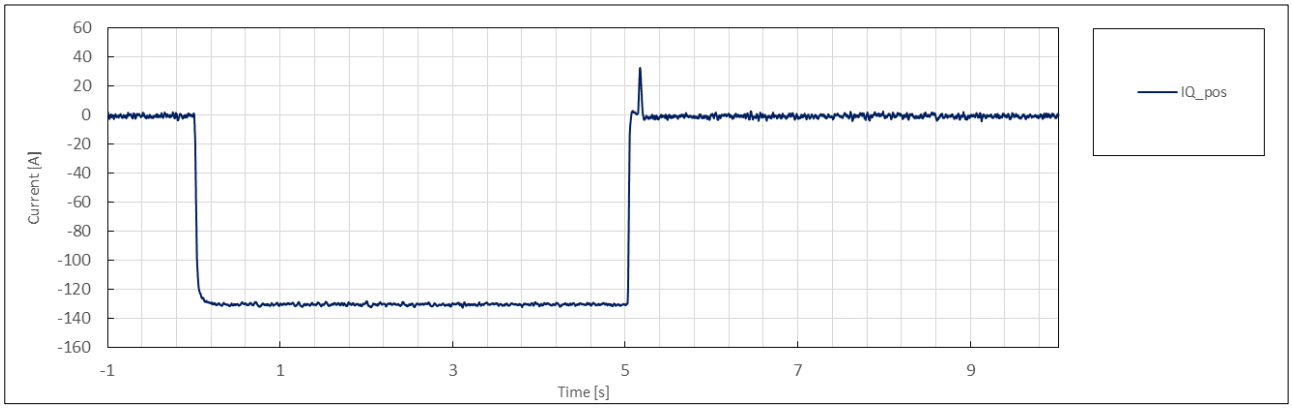


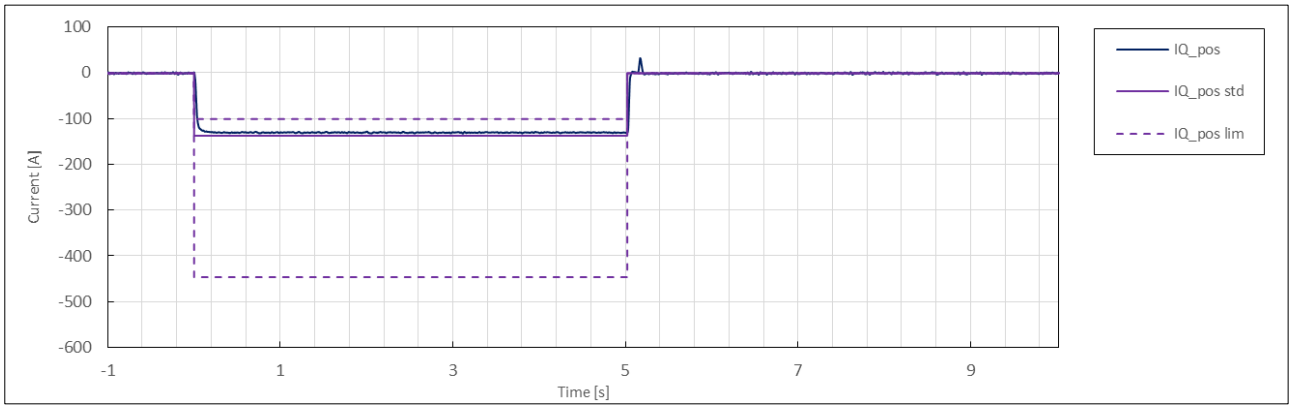

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
1
3
5
7
9
Time [s]
Ia
Ib
Ic

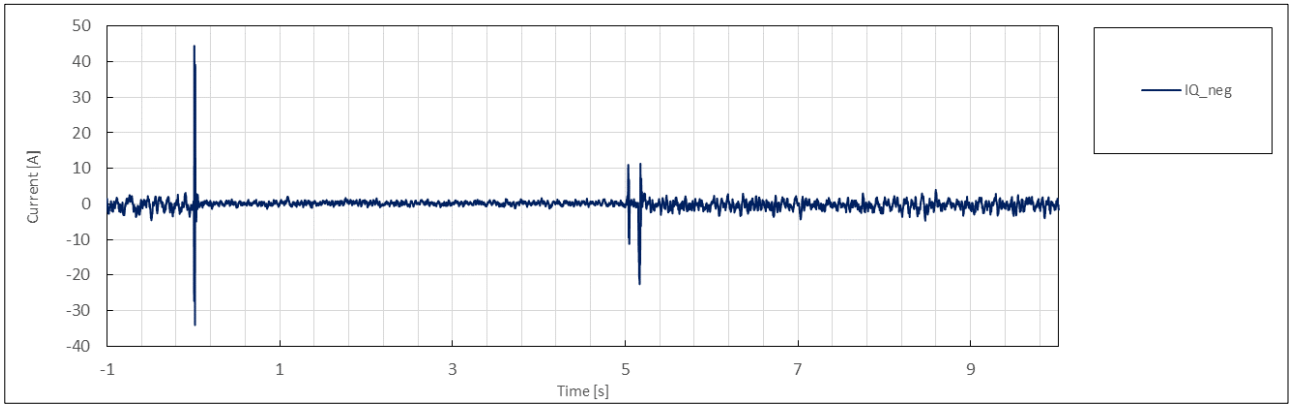

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

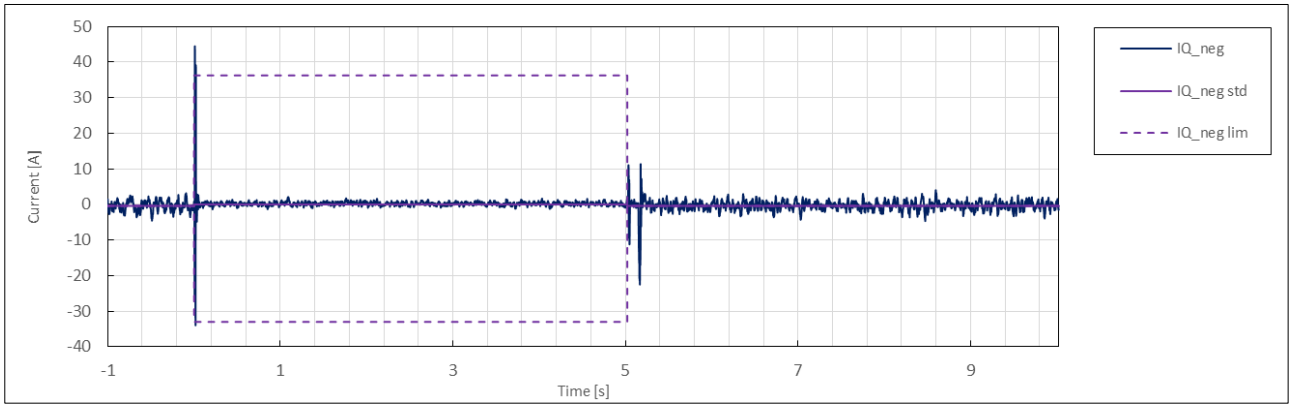

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
IP_pos

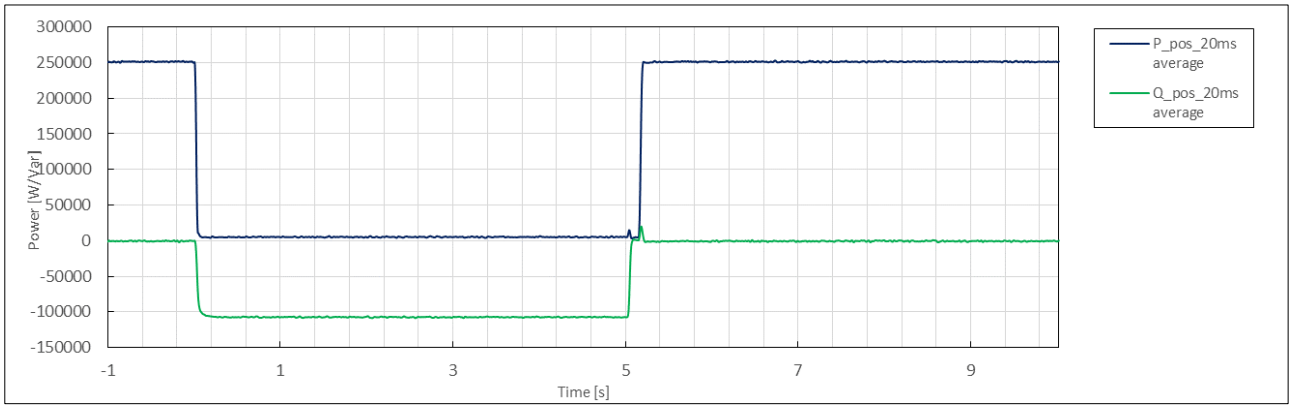

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
IP_pos
IP_posstd


60
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_pos

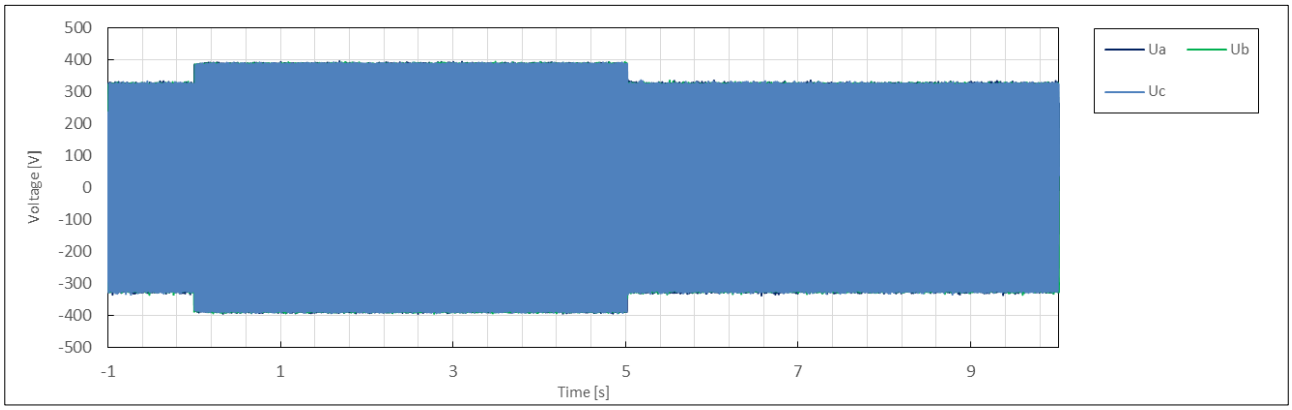

100
0
-100
-200
-300
-400
-500
-600
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

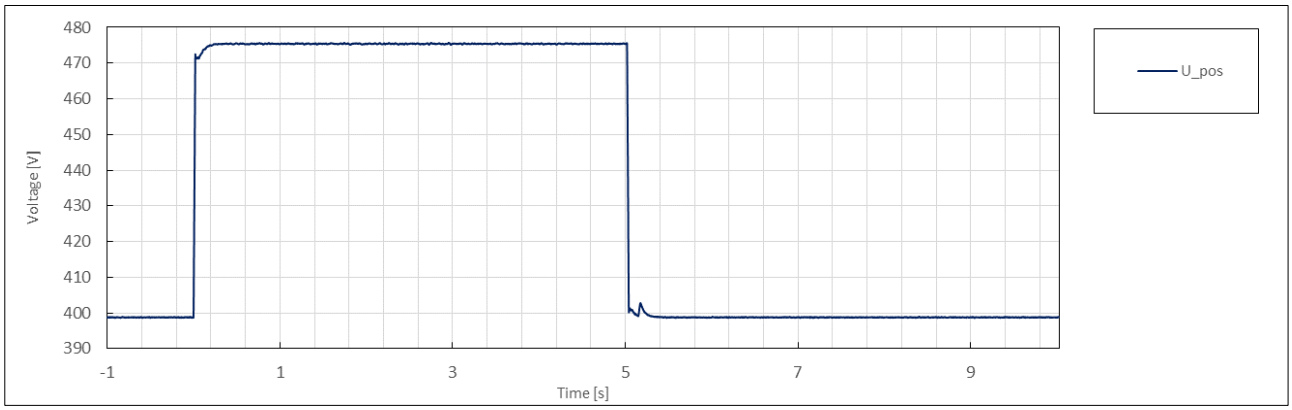

50
40
30
20
10
0
-10
-20
-30
-40
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_neg

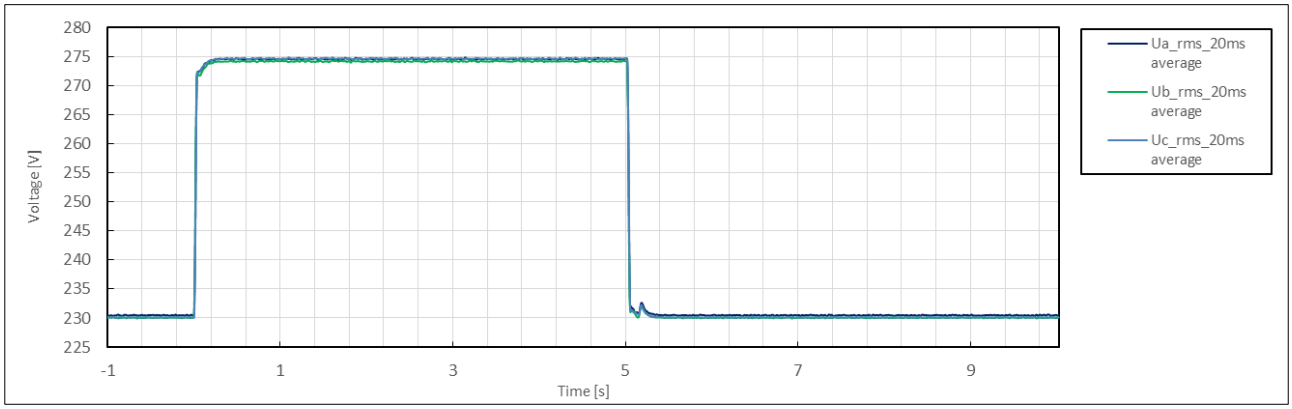

50
40
30
20
10
0
-10
-20
-30
-40
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
-150000
Power [W/Var]
-1
1
3
5
7
9
Time [s]
P_pos_20ms average
Q_pos_20ms average

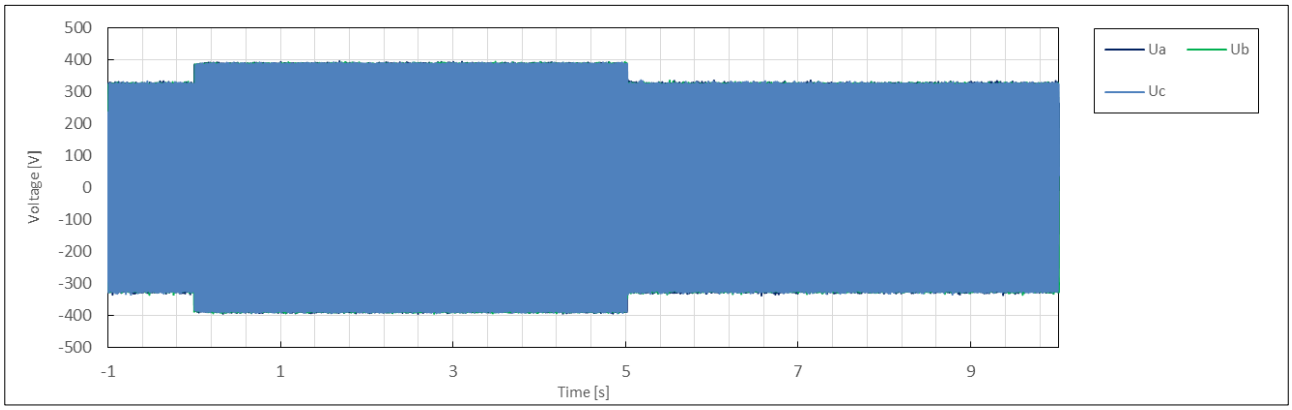
No. 7.2 Idle Test

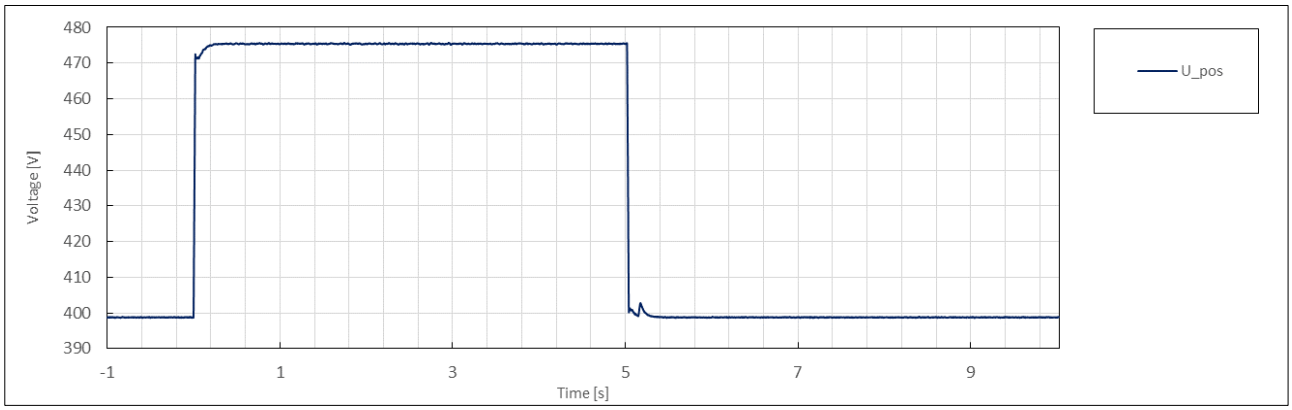


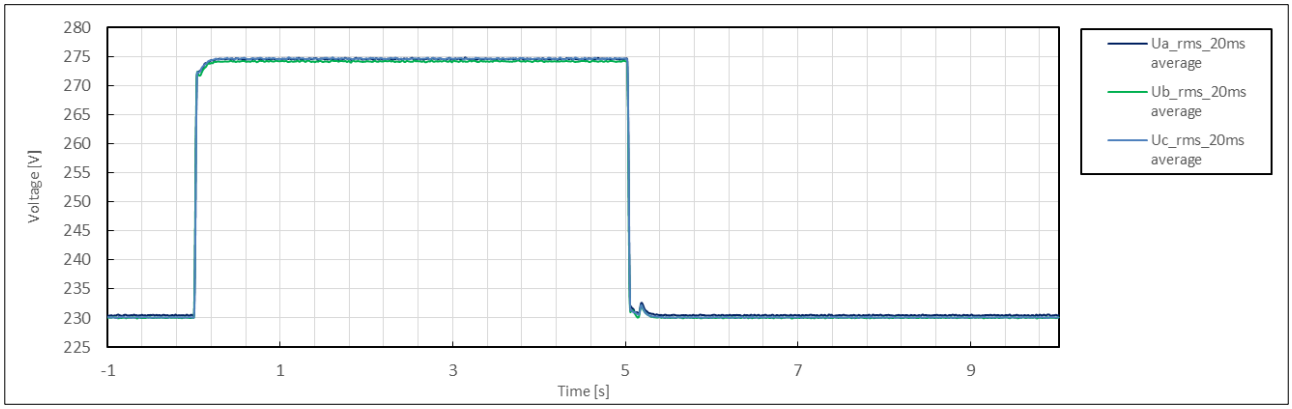


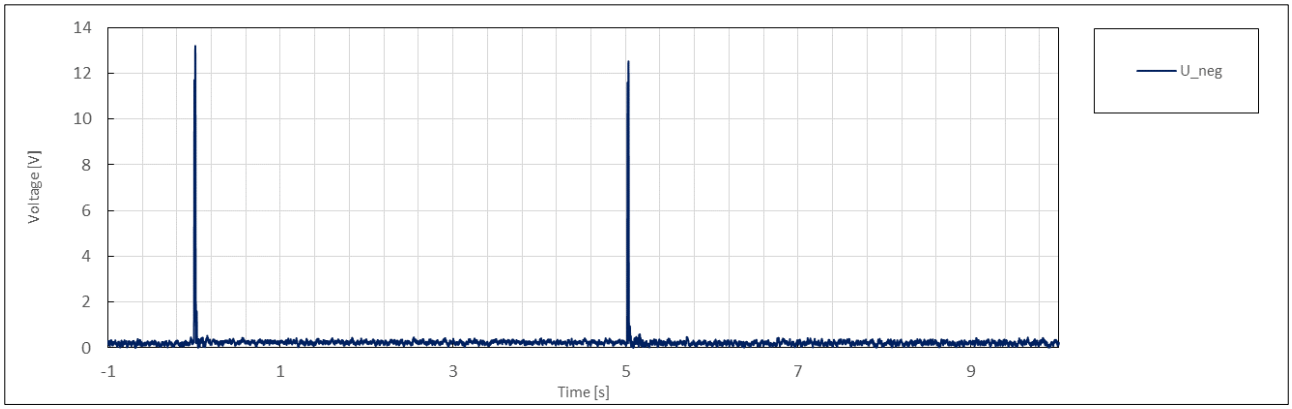


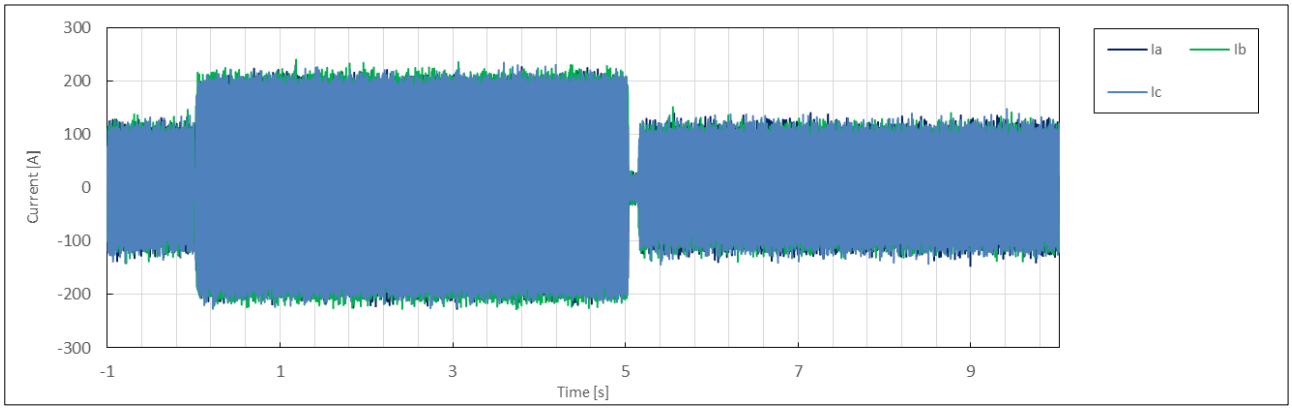
No. 7.2 Load Test

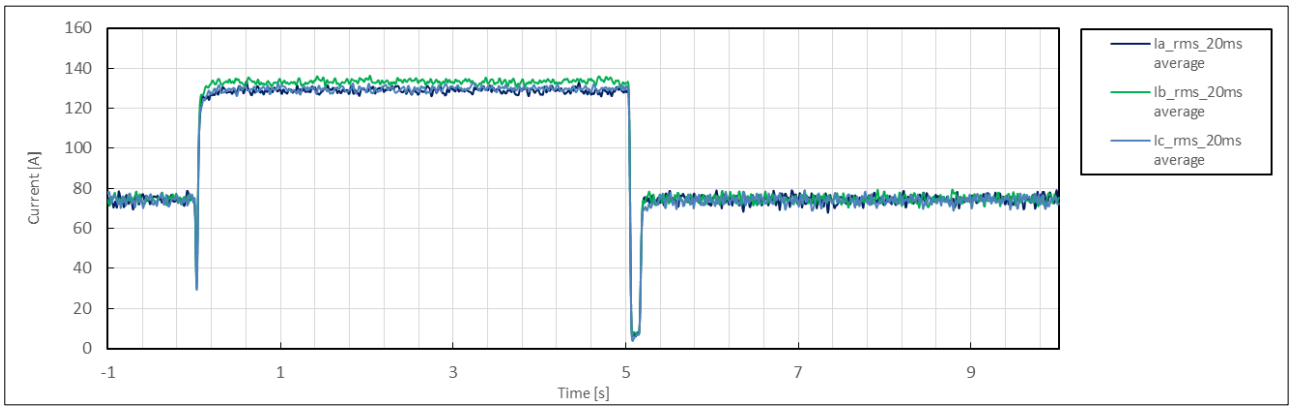


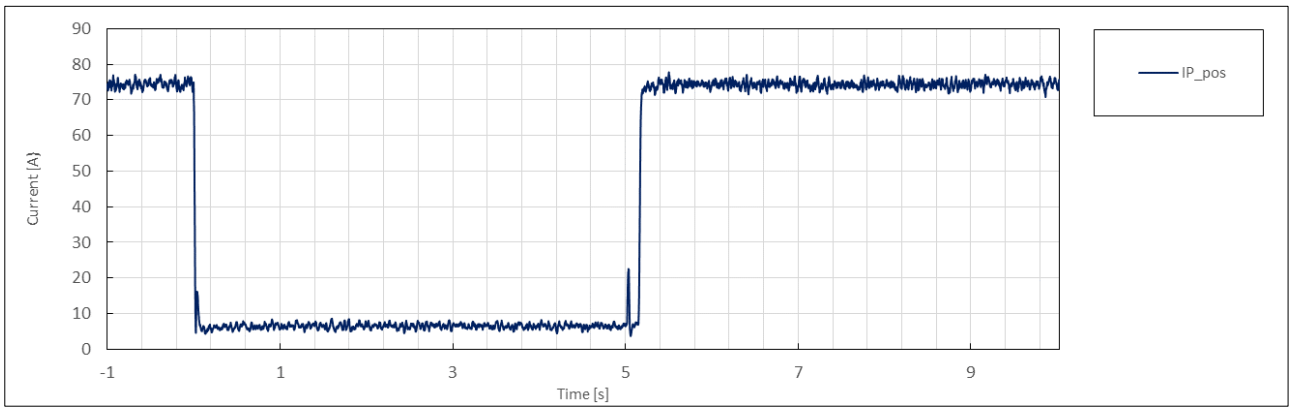


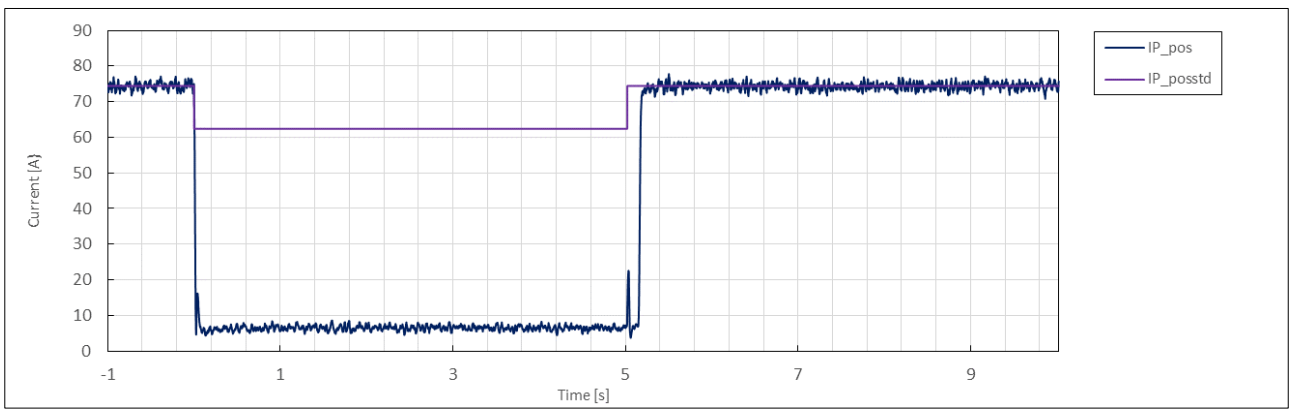


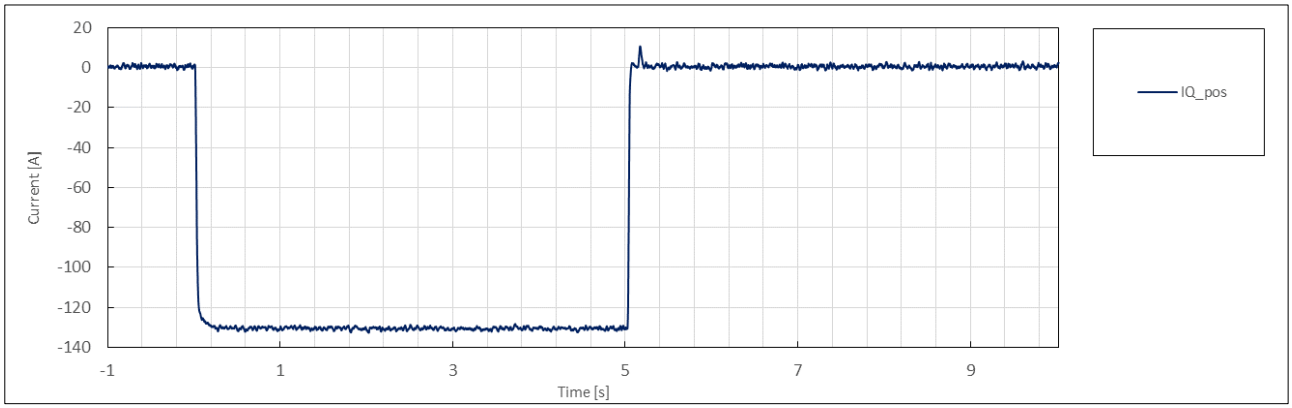


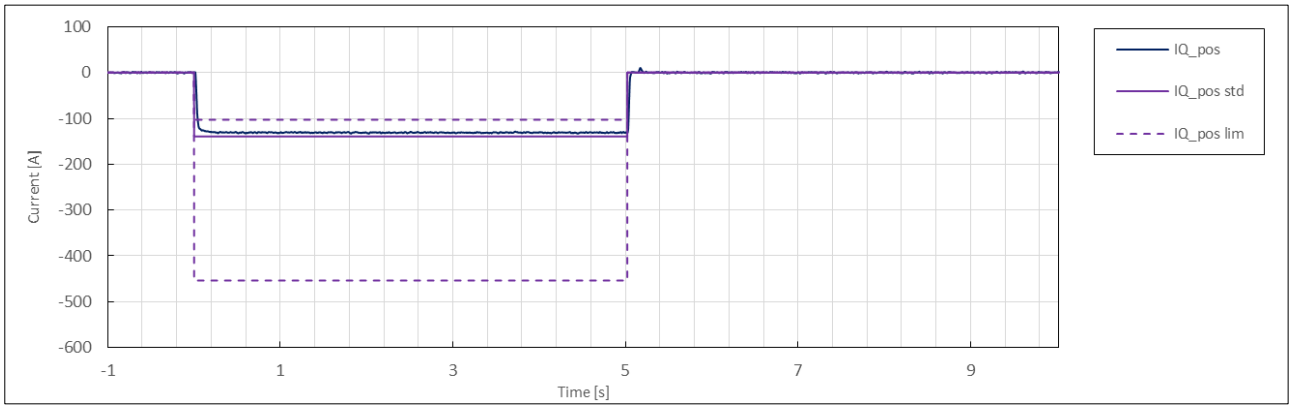

Current [A]
Time [s]
Ia
Ib
Ic

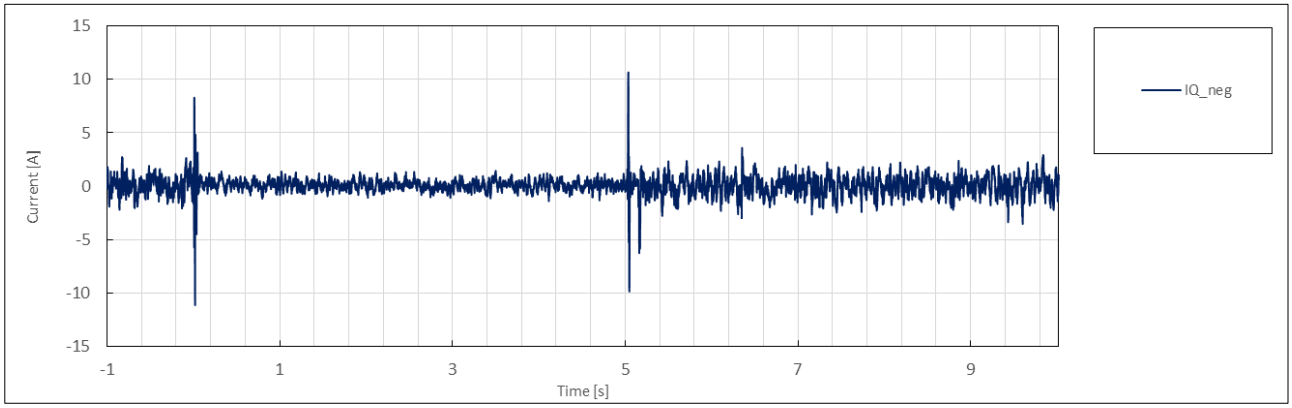

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

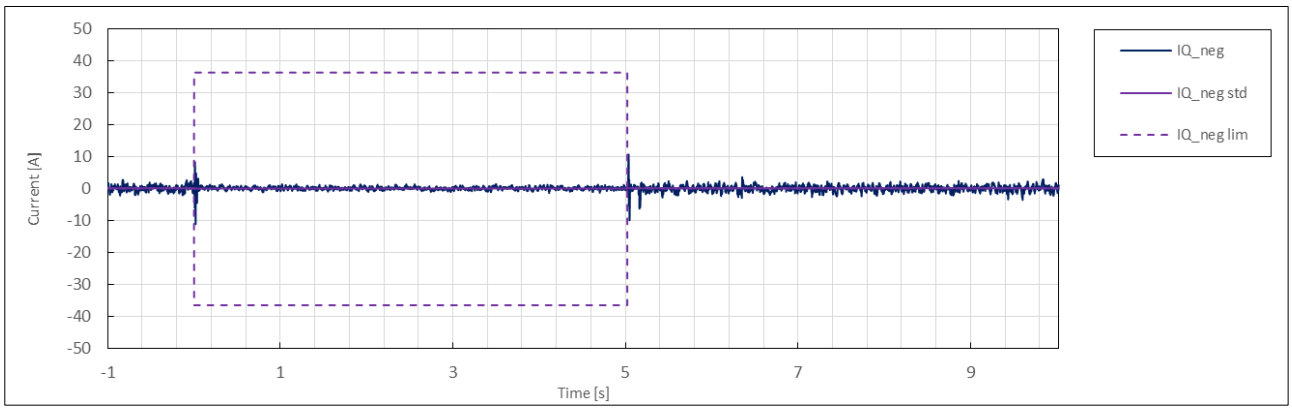

Current [A]
Time [s]
IP_pos

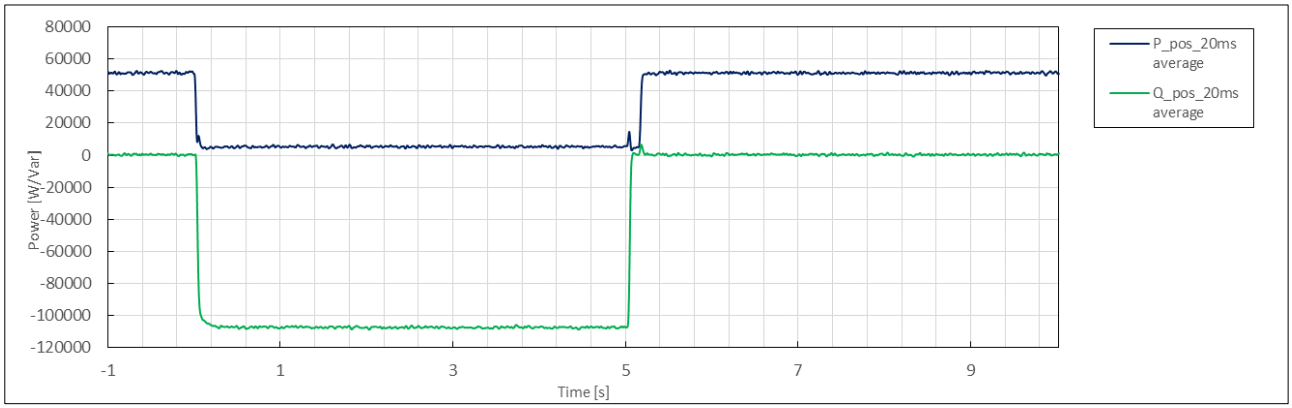

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

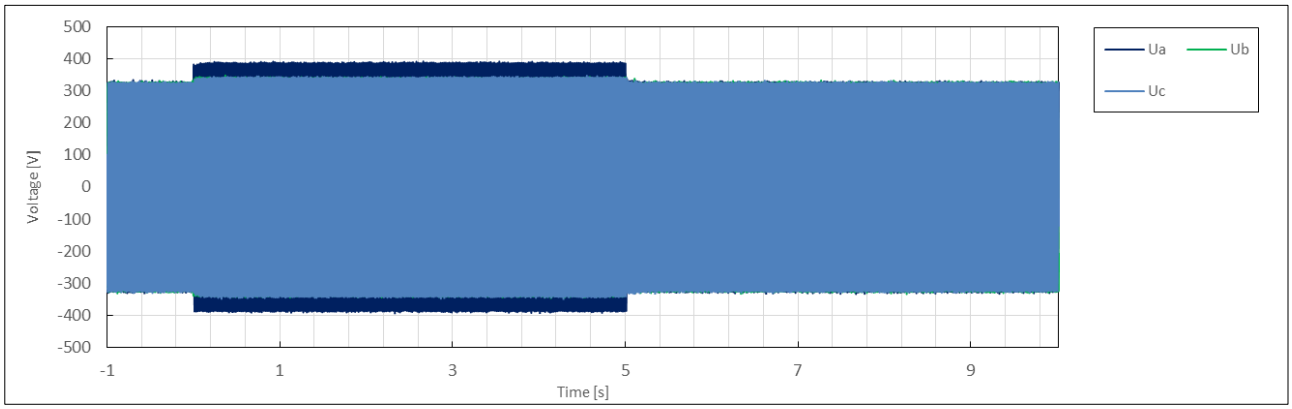

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

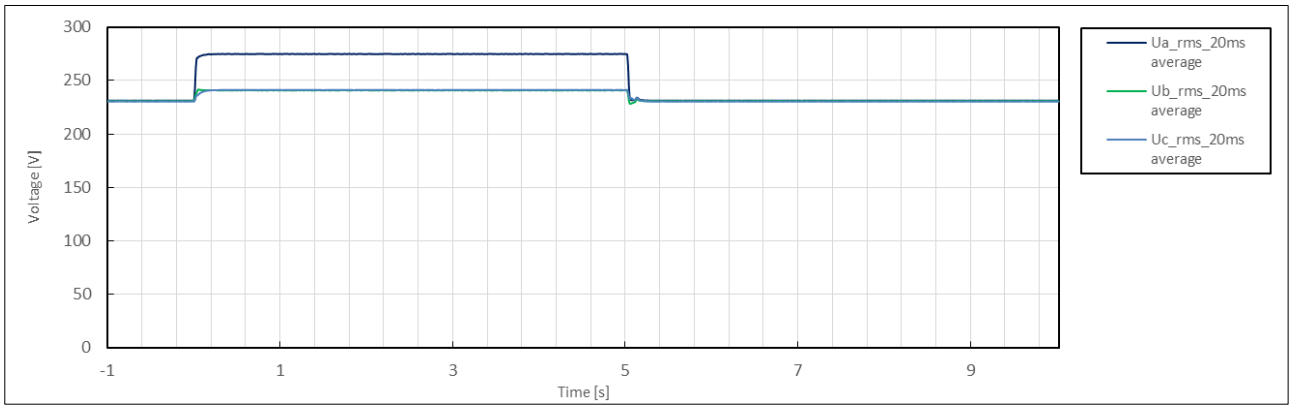

Current [A]
Time [s]
IQ_neg

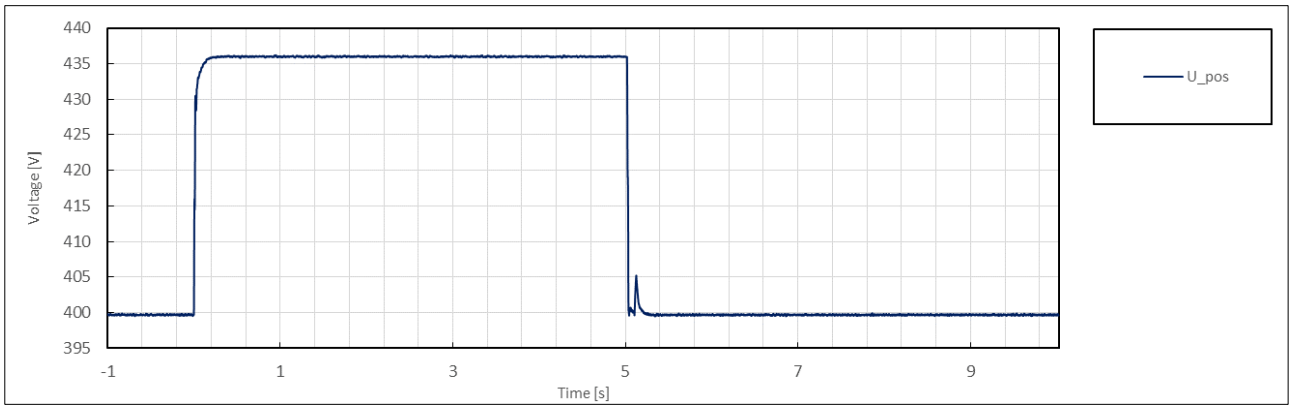

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


80000
60000
40000
20000
0
-20000
-40000
-60000
-80000
-100000
-120000
Power [W/Var]
-1
1
3
5
7
9
Time [s]
P_pos_20ms average
Q_pos_20ms average

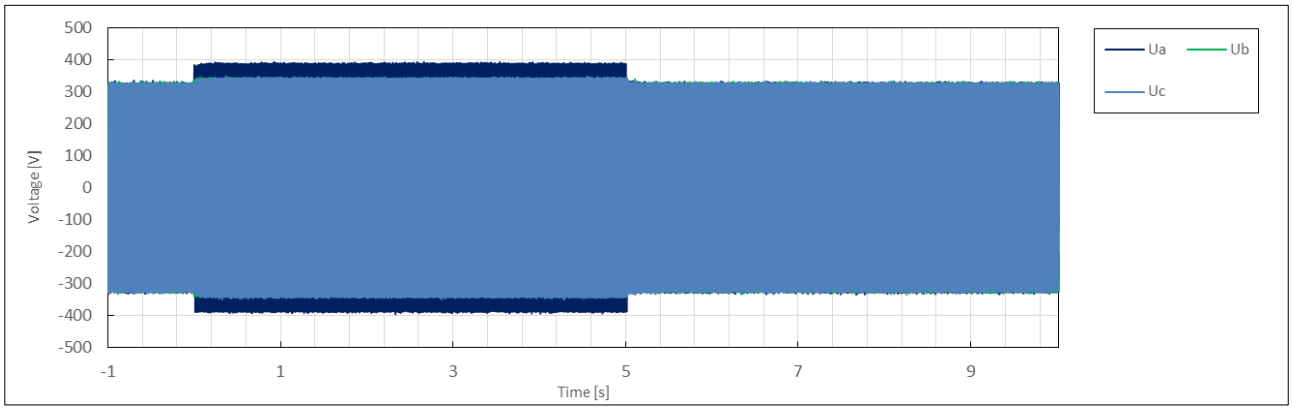
No. 7.3 Idle Test

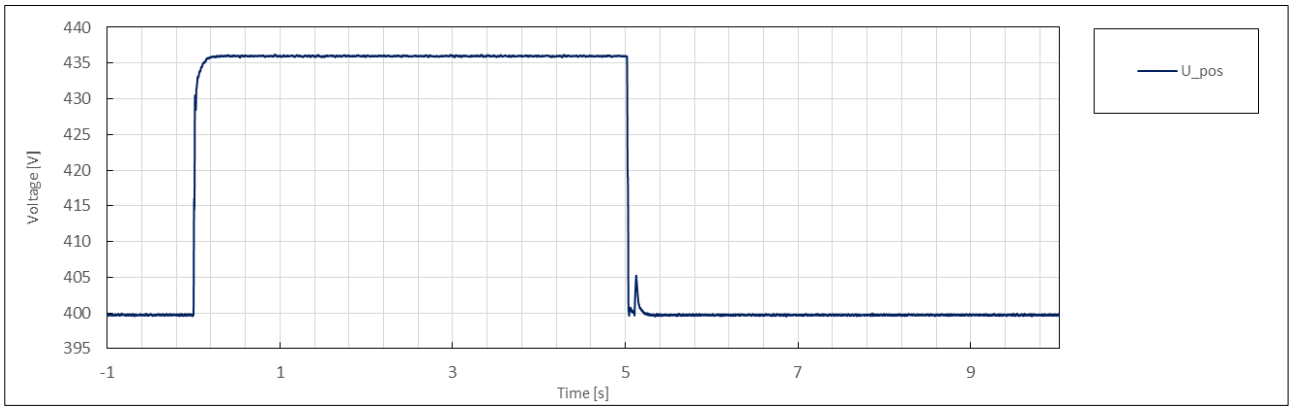


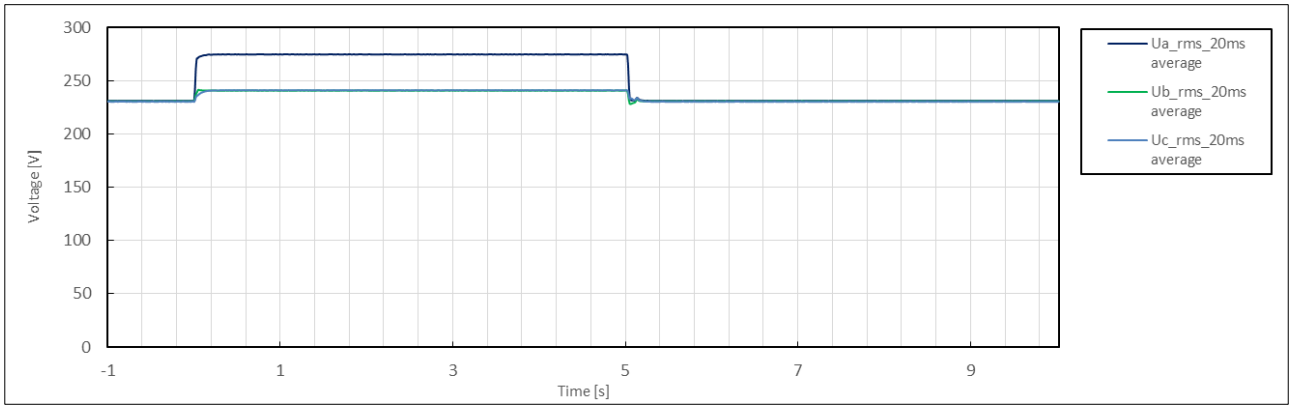


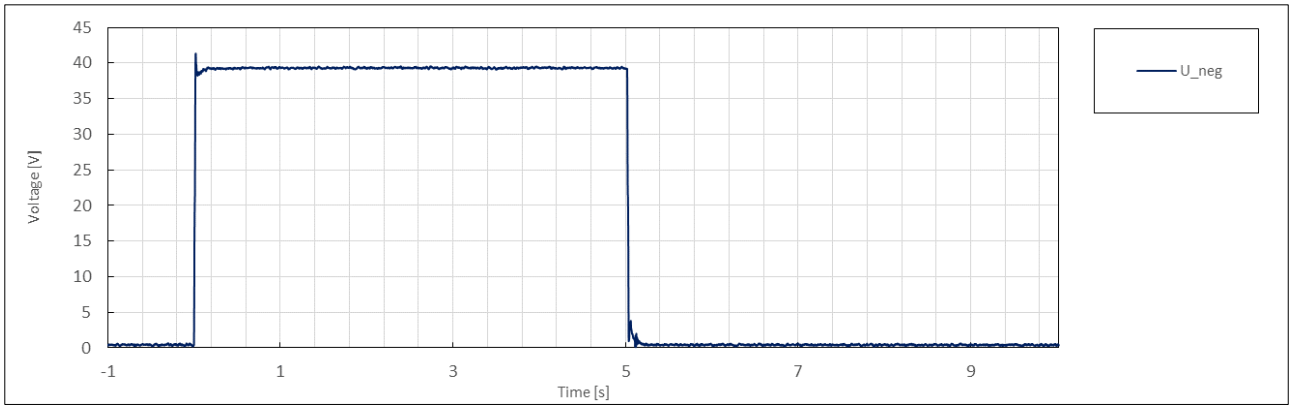


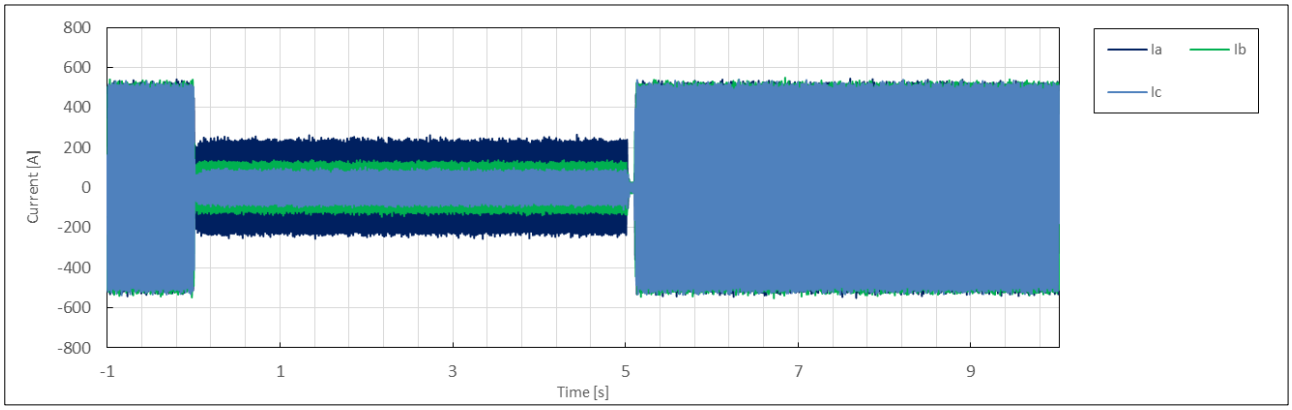
No. 7.3 Load Test

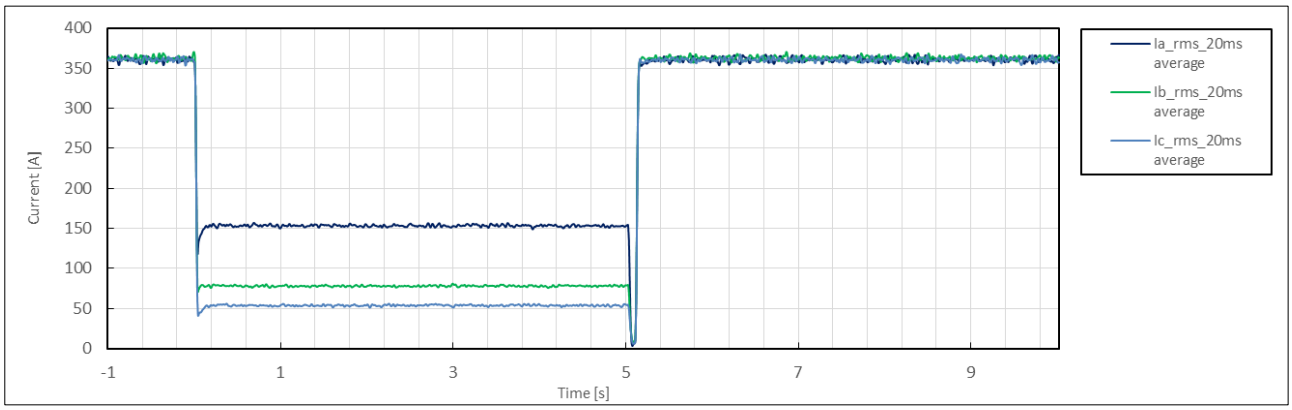


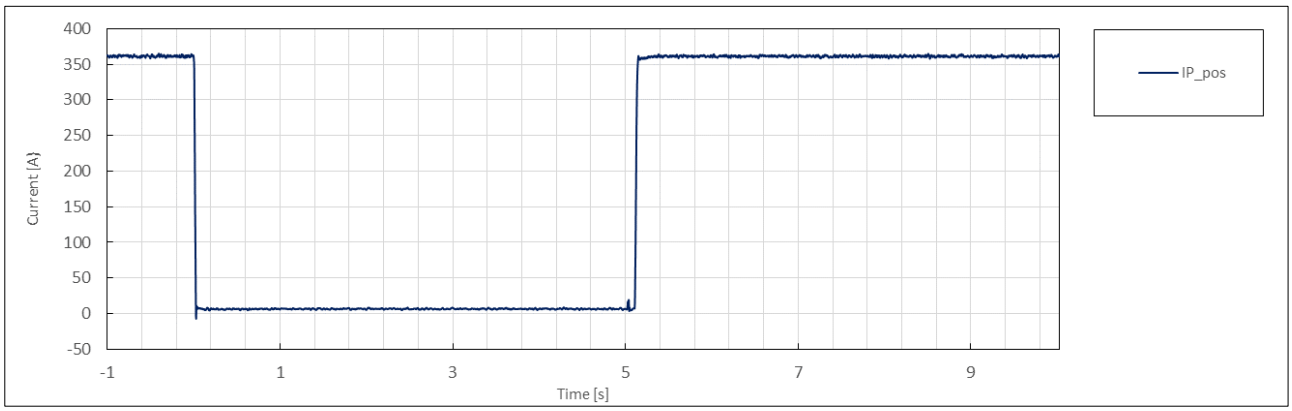


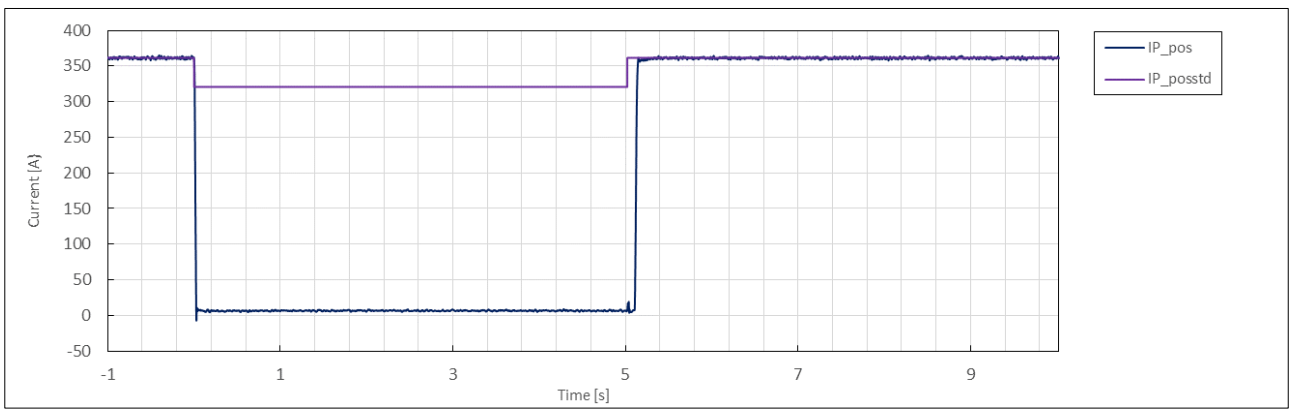


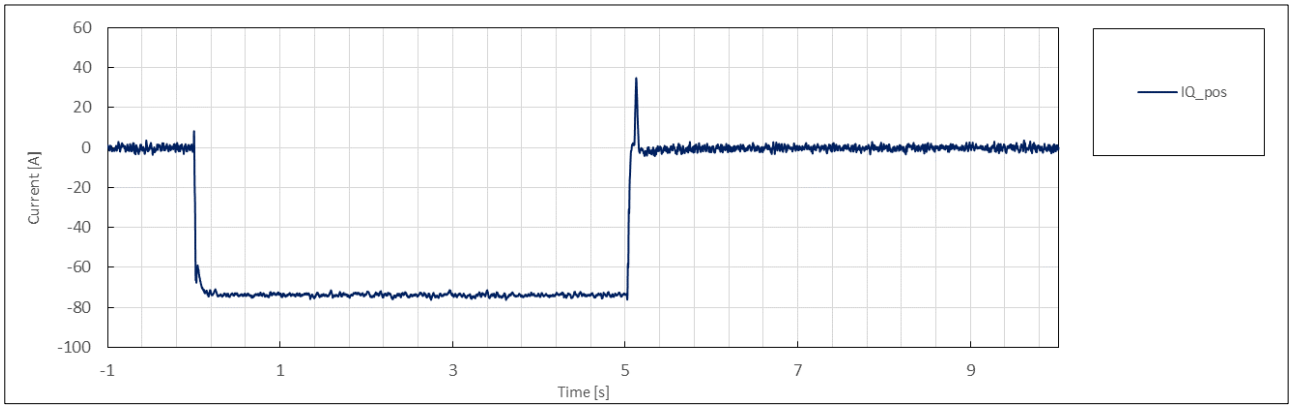


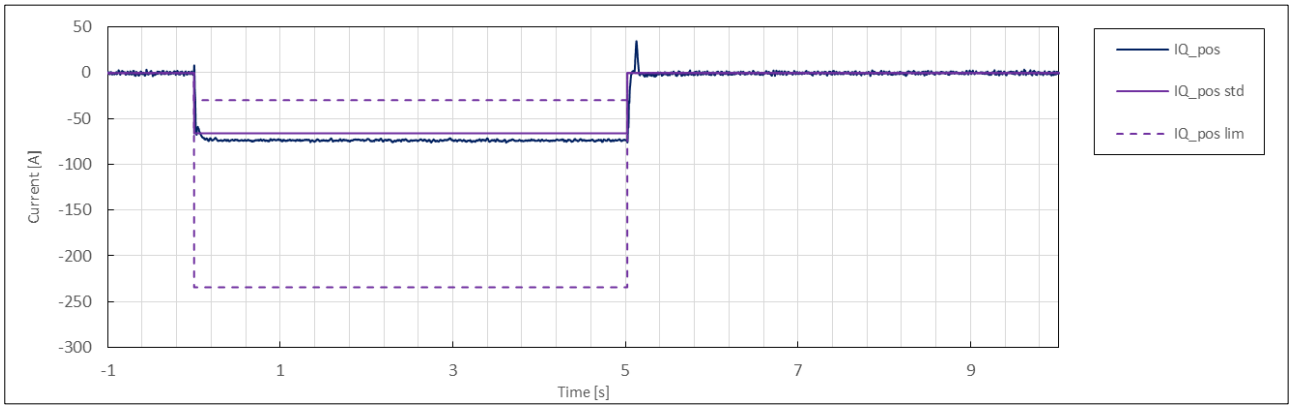

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
1
3
5
7
9
Time [s]
Ia
Ib
Ic

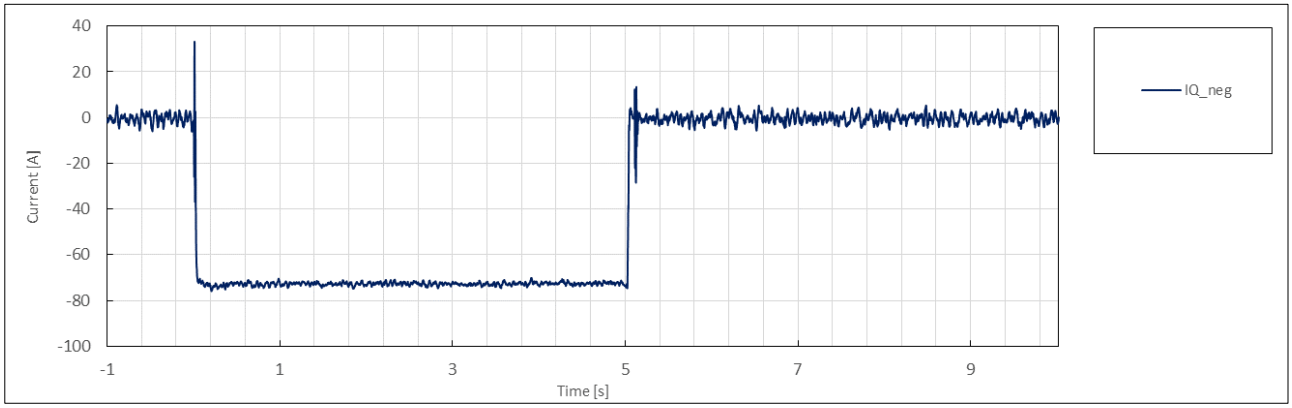

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

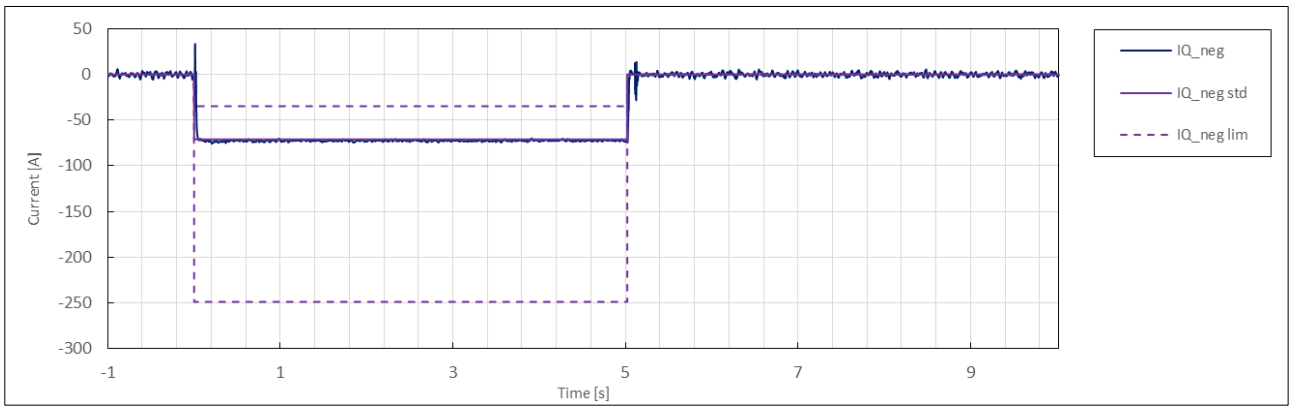

400
350
300
250
200
150
100
50
0
-50
Current [A]
-1
1
3
5
7
9
Time [s]
IP_pos

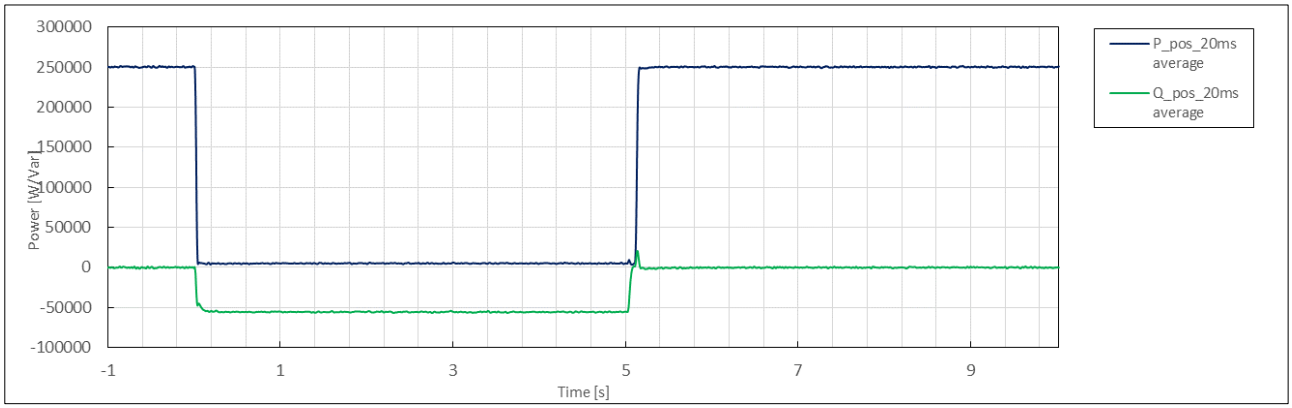

400
350
300
250
200
150
100
50
0
-50
Current [A]
-1
1
3
5
7
9
Time [s]
IP_pos
IP_posstd


60
40
20
0
-20
-40
-60
-80
-100
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_pos

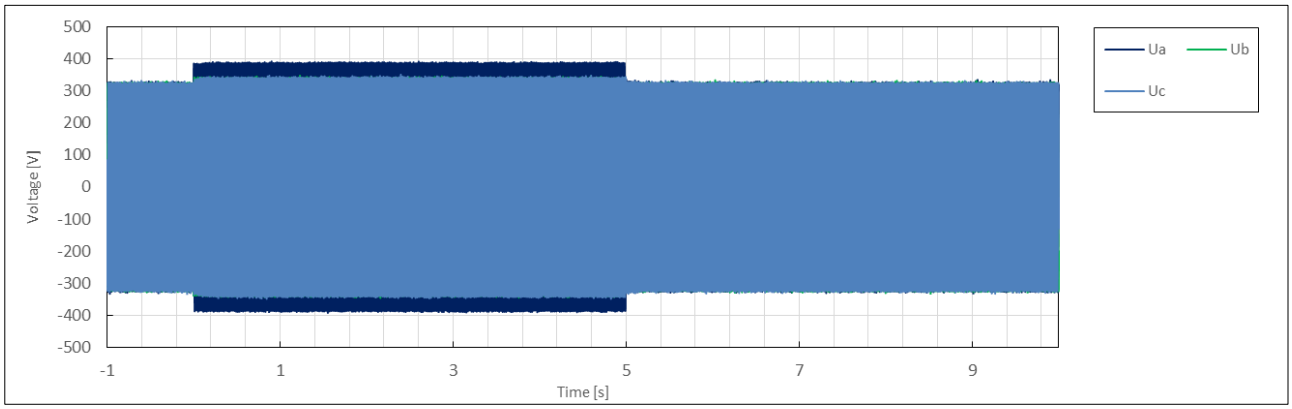

50
0
-50
-100
-150
-200
-250
-300
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

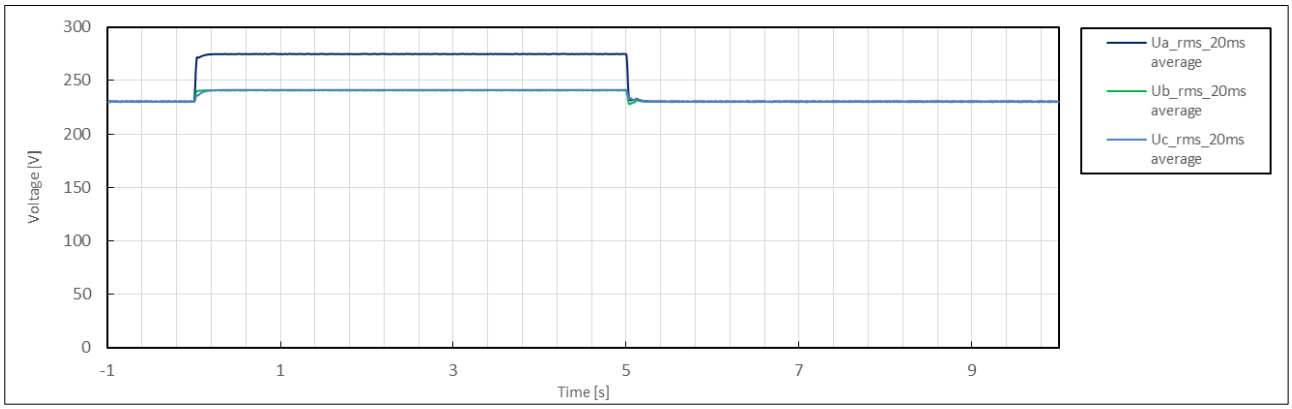

40
20
0
-20
-40
-60
-80
-100
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_neg

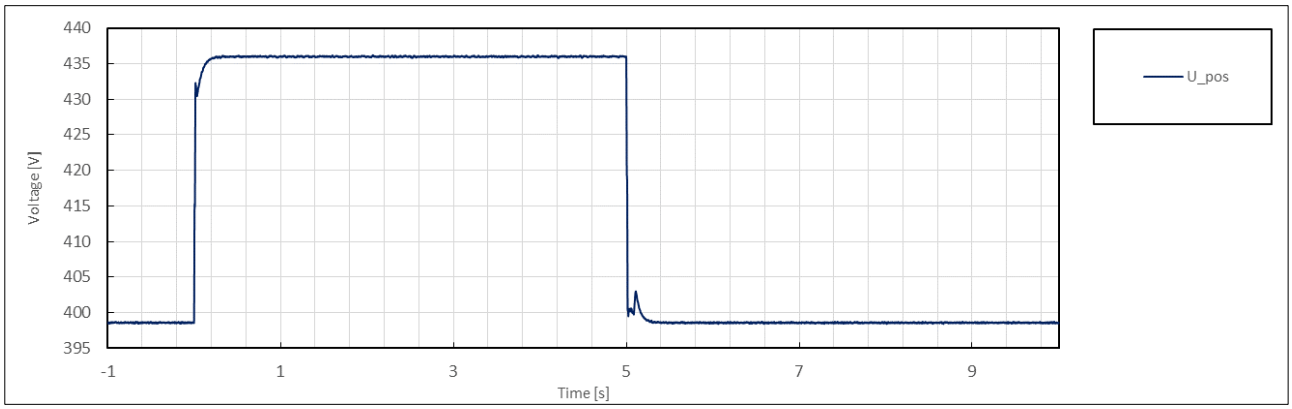

50
0
-50
-100
-150
-200
-250
-300
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
Power [W/Var]
-1
1
3
5
7
9
Time [s]
P_pos_20ms average
Q_pos_20ms average

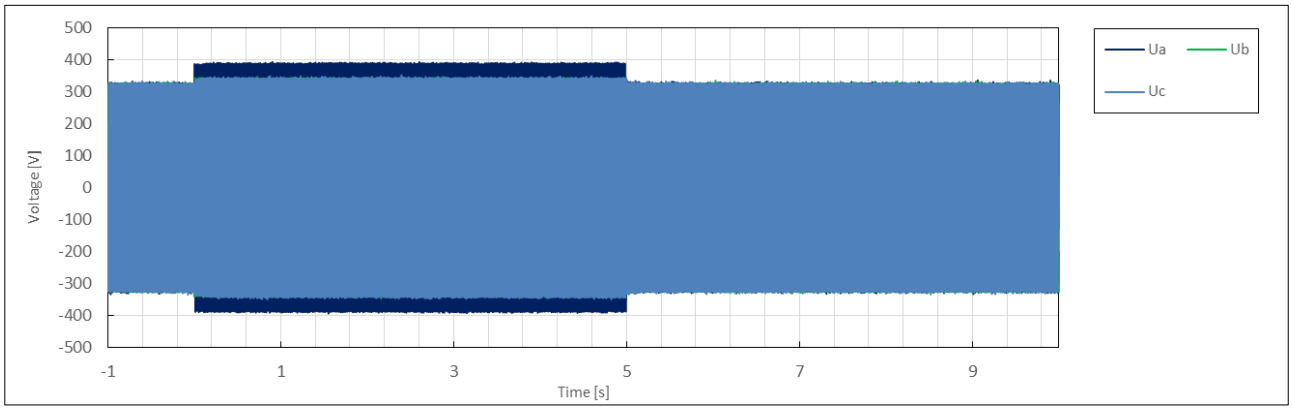
No. 7.4 Idle Test

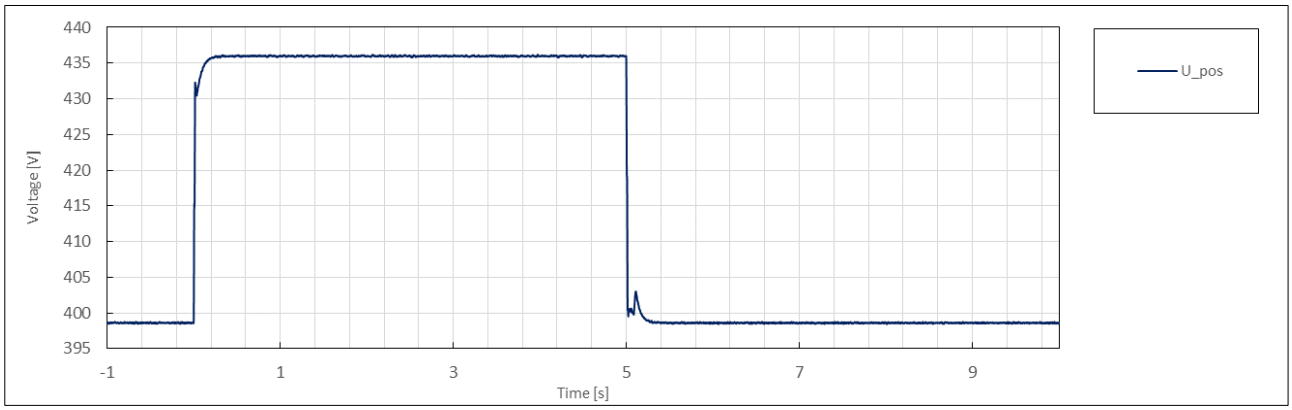


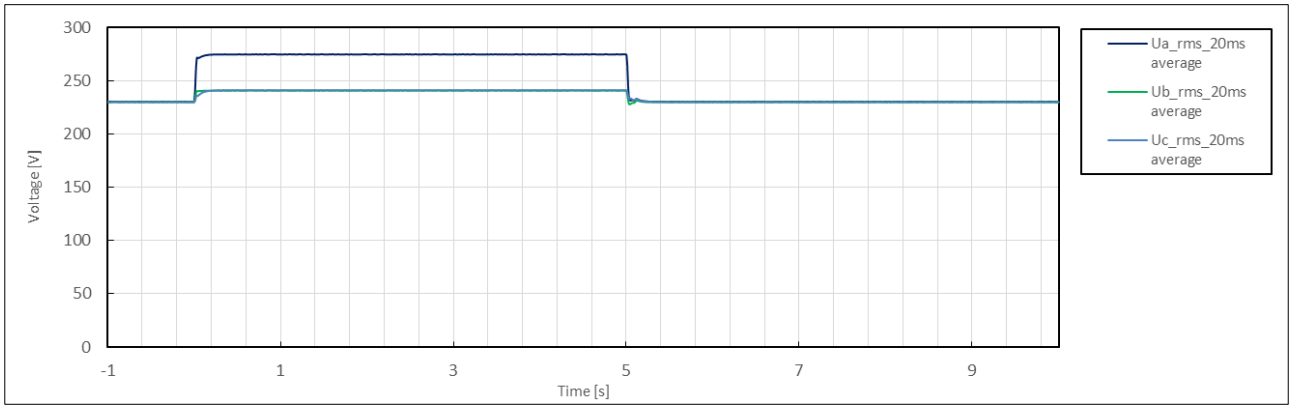


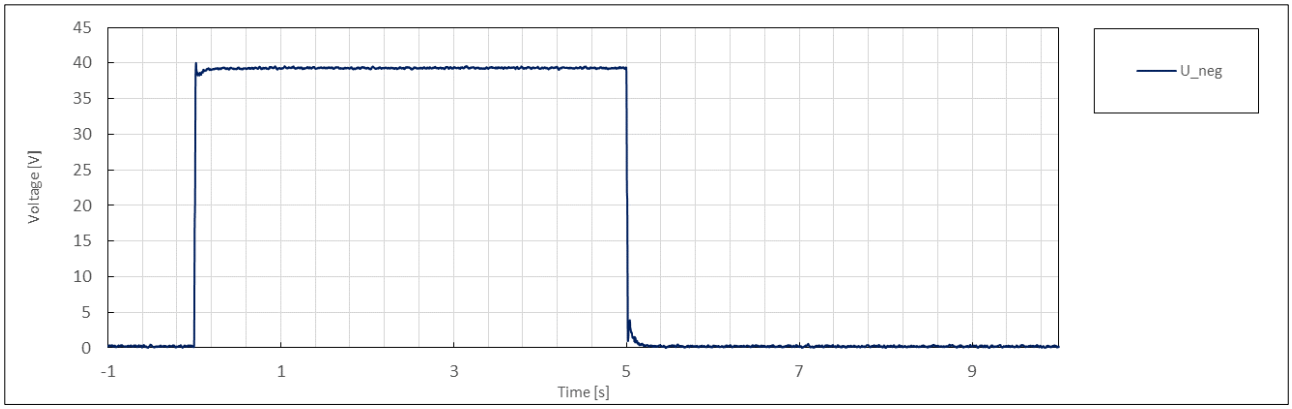


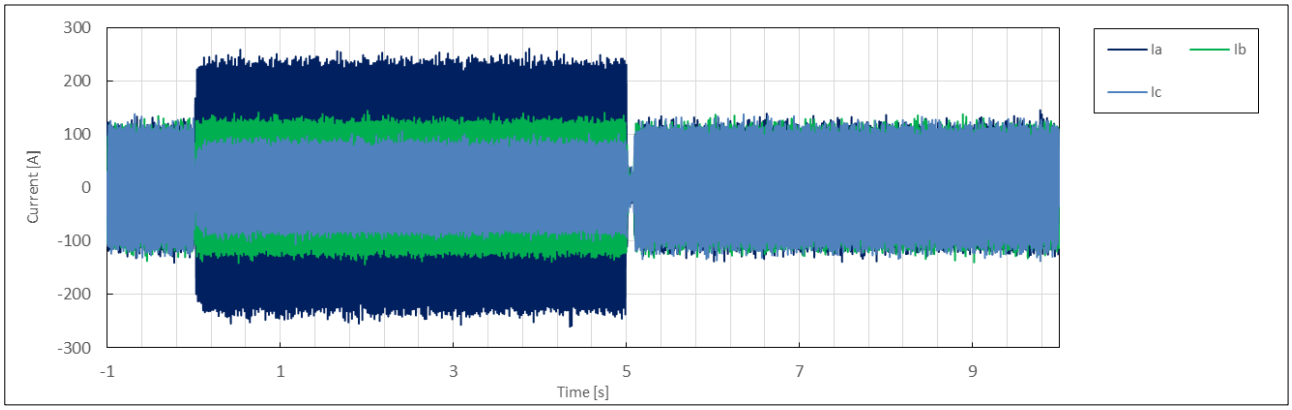
No. 7.4 Load Test

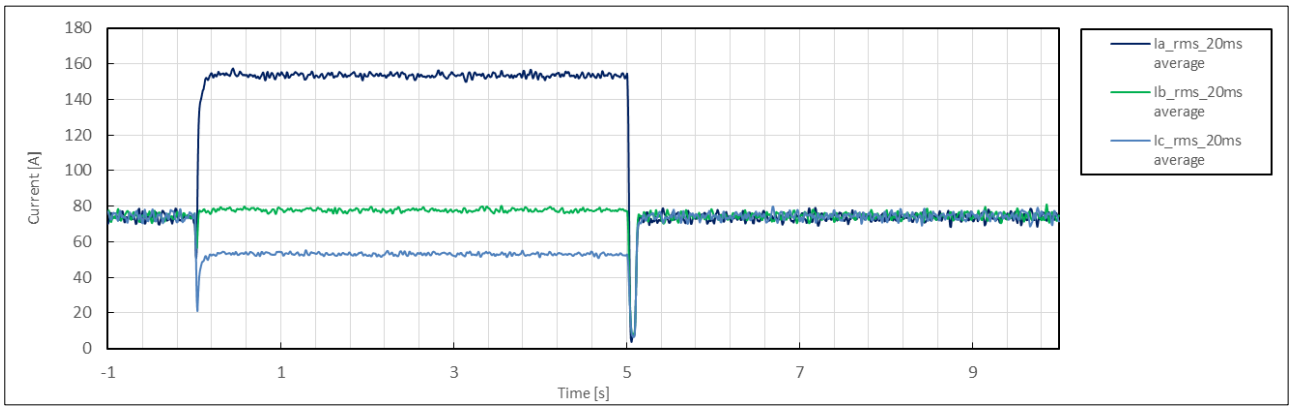


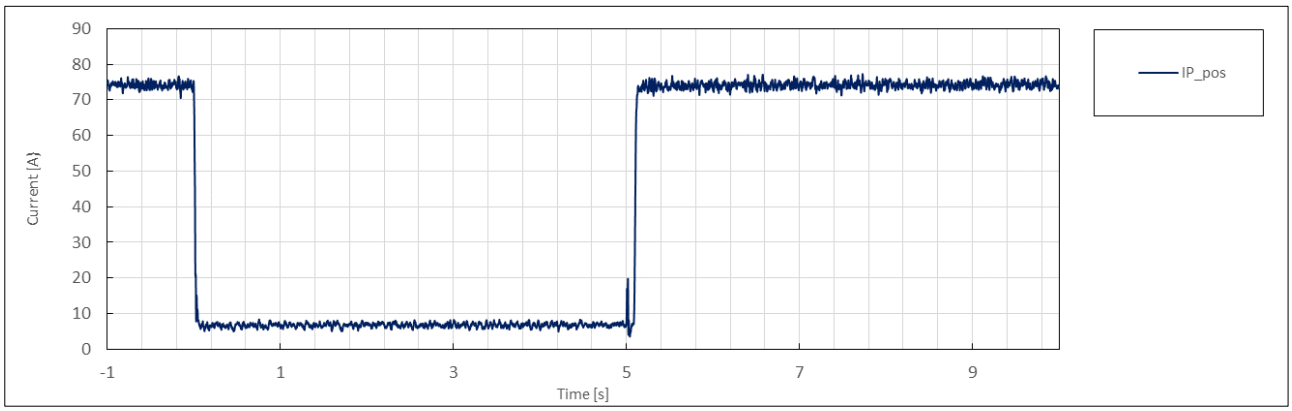


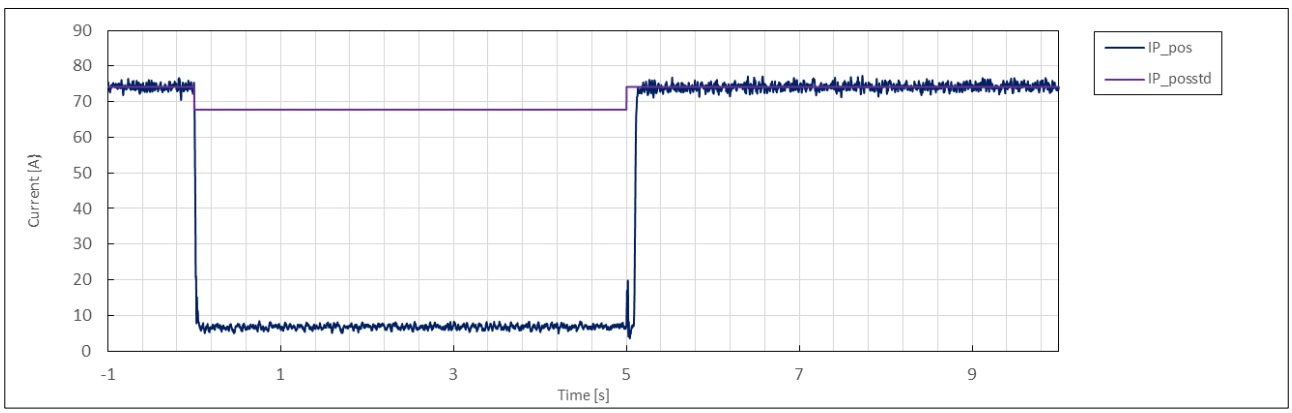


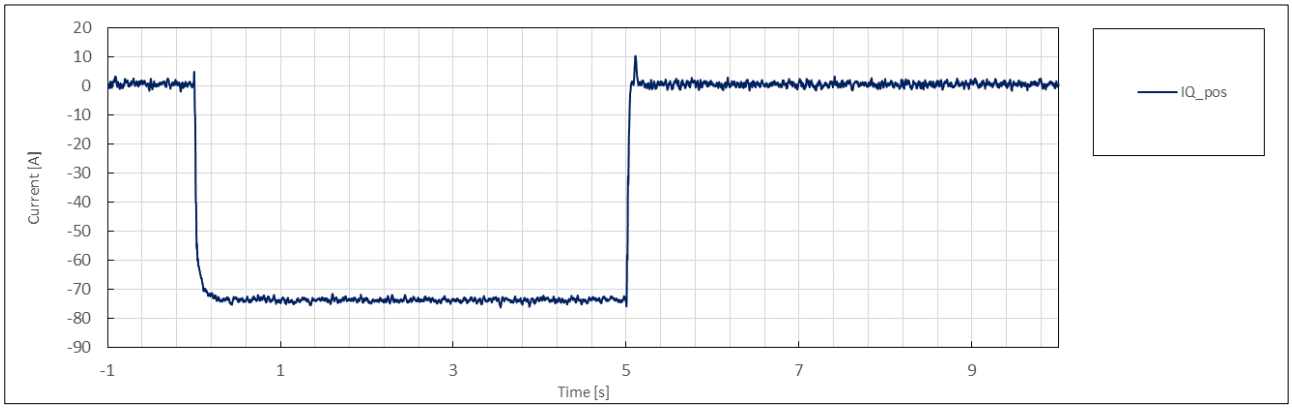


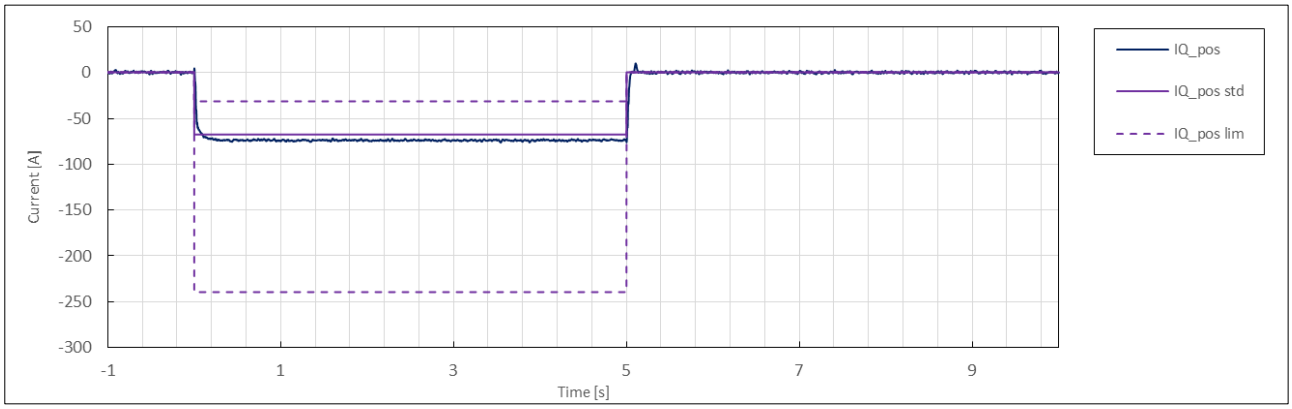

Current [A]
Time [s]
Ia
Ib
Ic

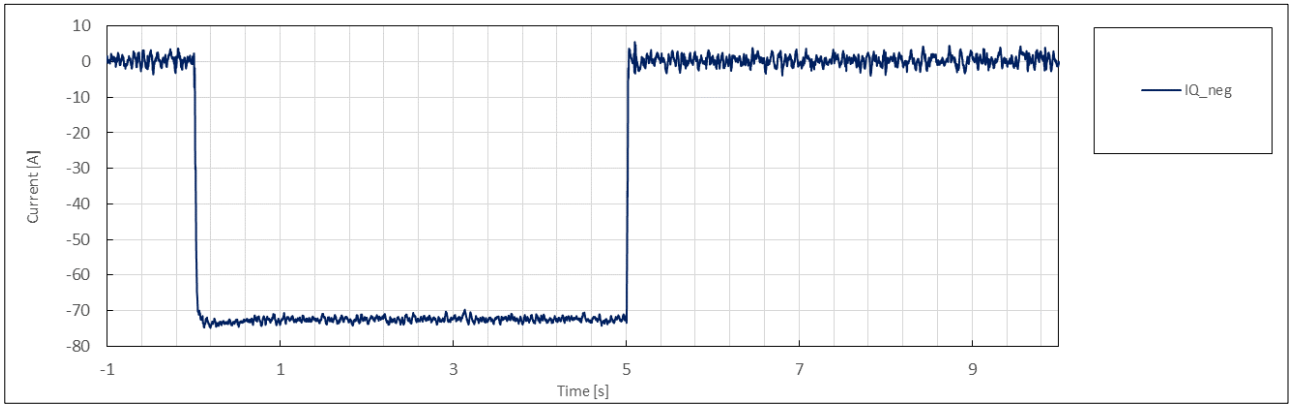

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

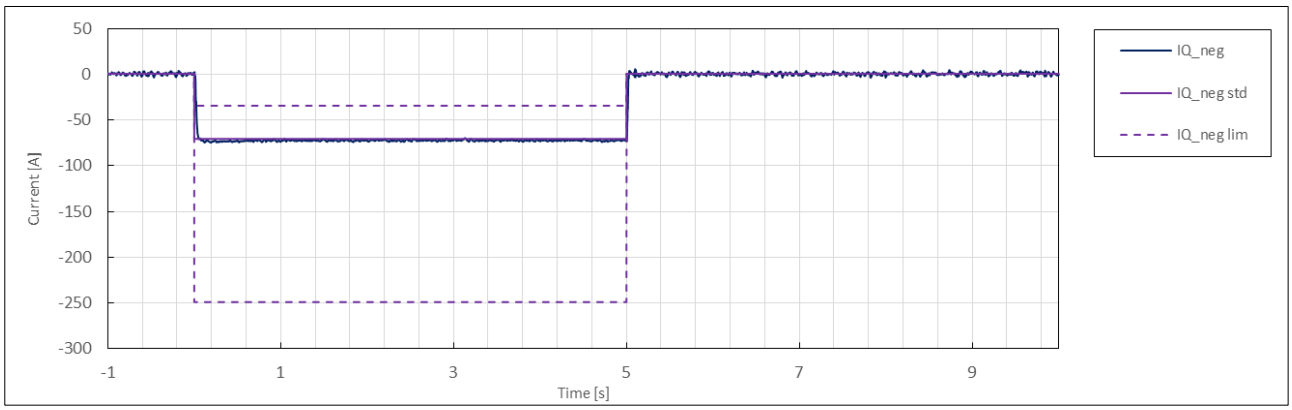

Current [A]
Time [s]
IP_pos

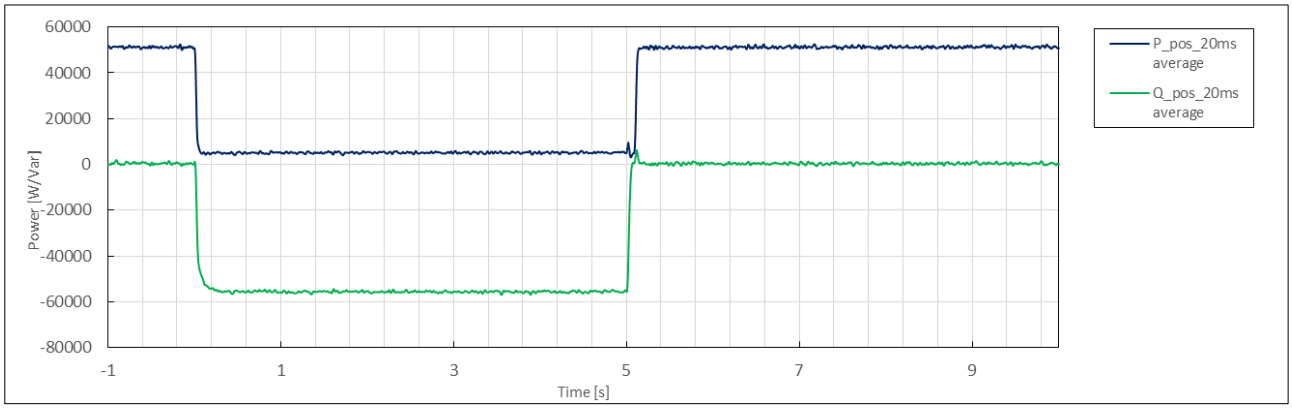

Current [A]
Time [s]
IP_pos
IP_posstd


20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_pos

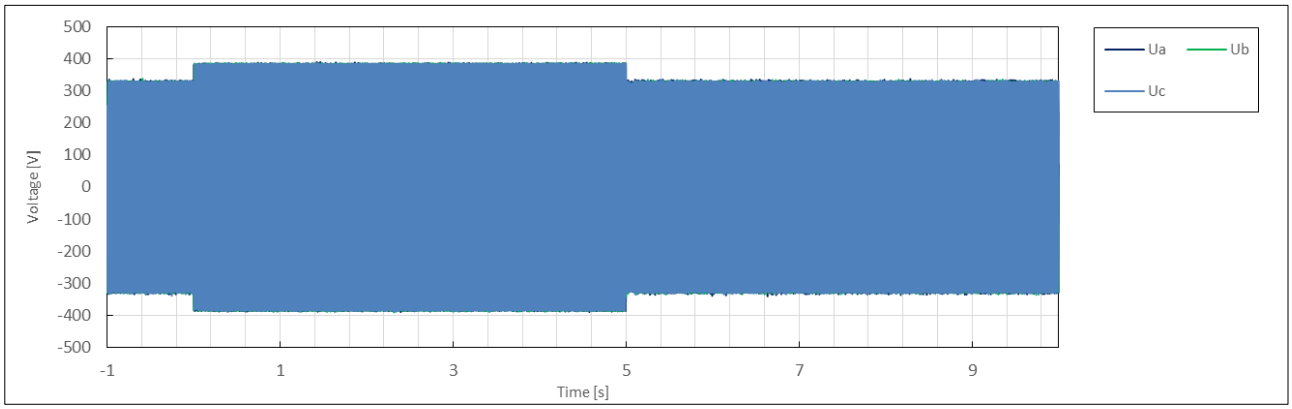

50
0
-50
-100
-150
-200
-250
-300
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

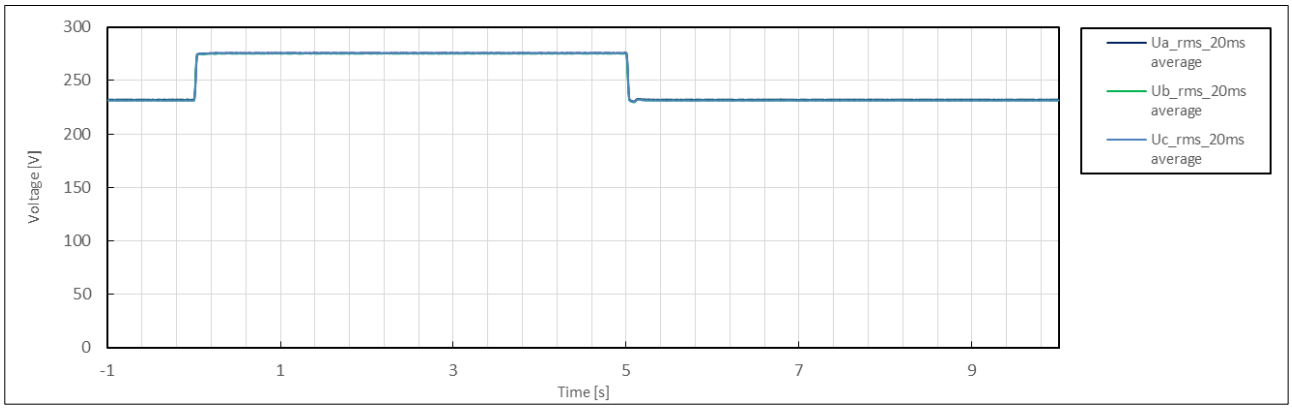

10
0
-10
-20
-30
-40
-50
-60
-70
-80
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_neg

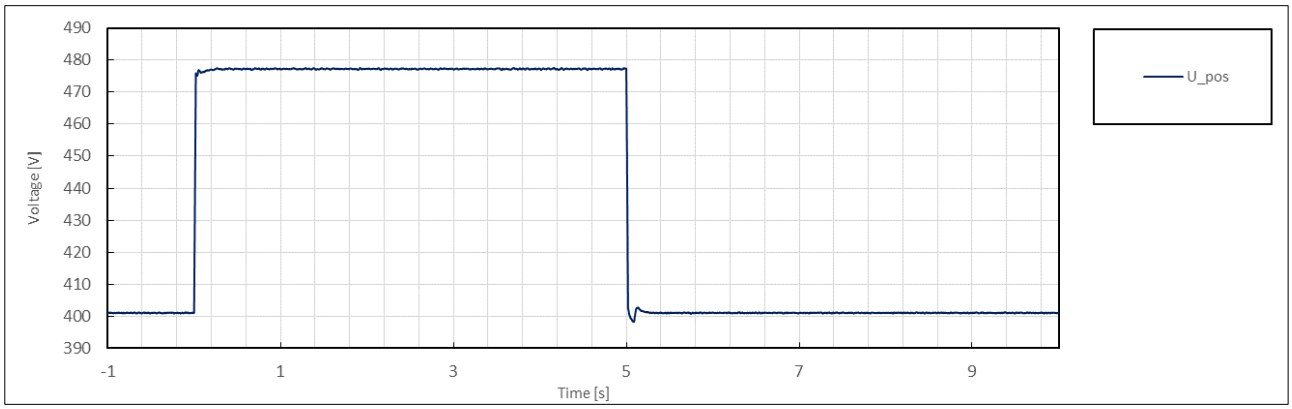

50
0
-50
-100
-150
-200
-250
-300
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


60000
40000
20000
0
-20000
-40000
-60000
-80000
Power [W/Var]
-1
1
3
5
7
9
Time [s]
P_pos_20ms average
Q_pos_20ms average

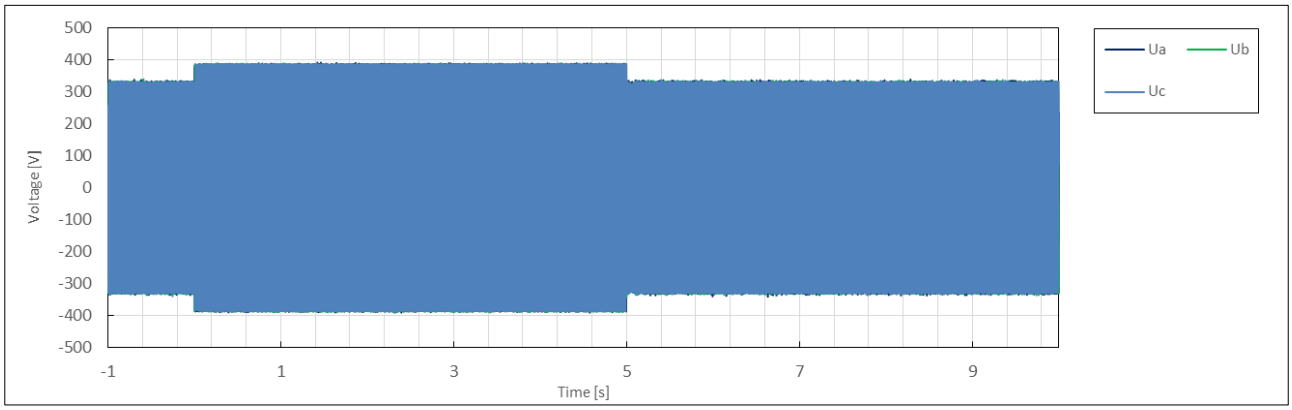
No. 7.5 Idle Test

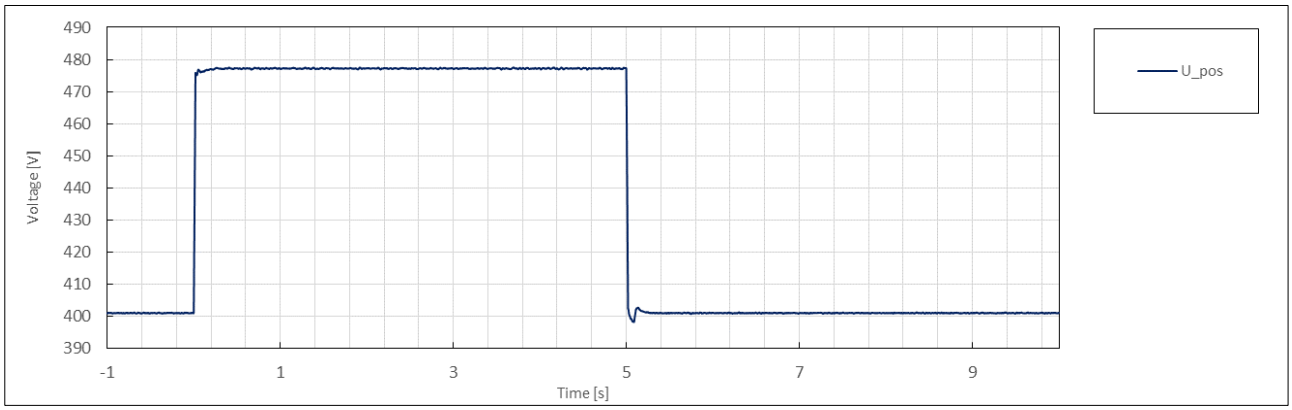


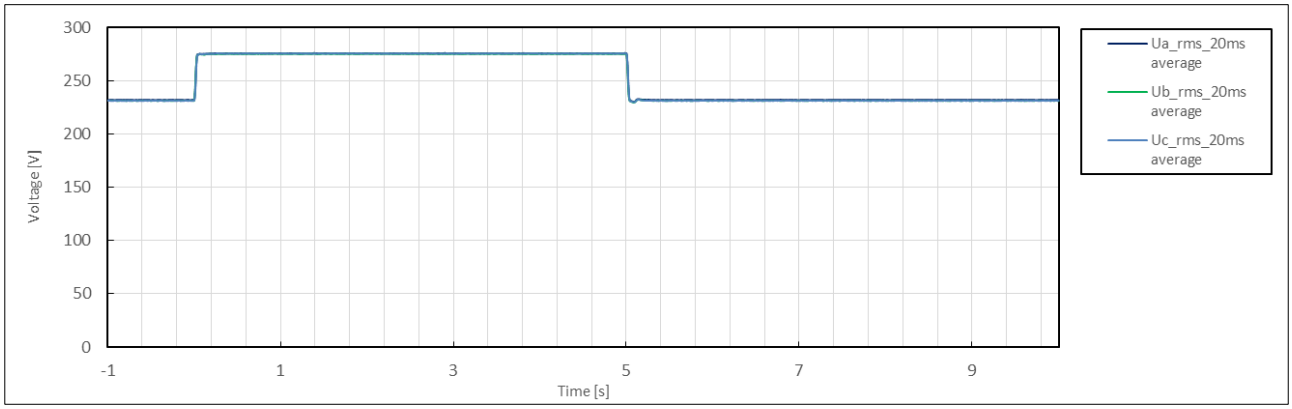


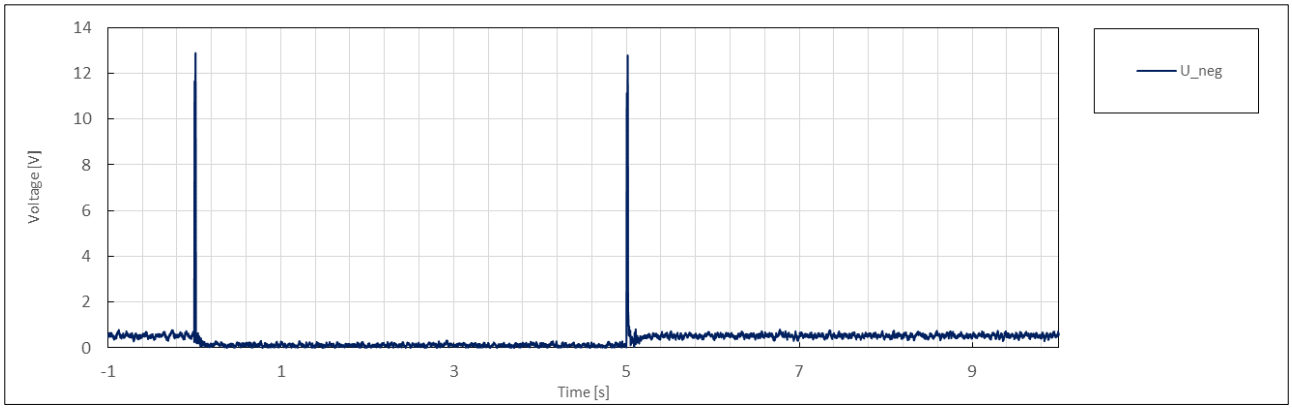


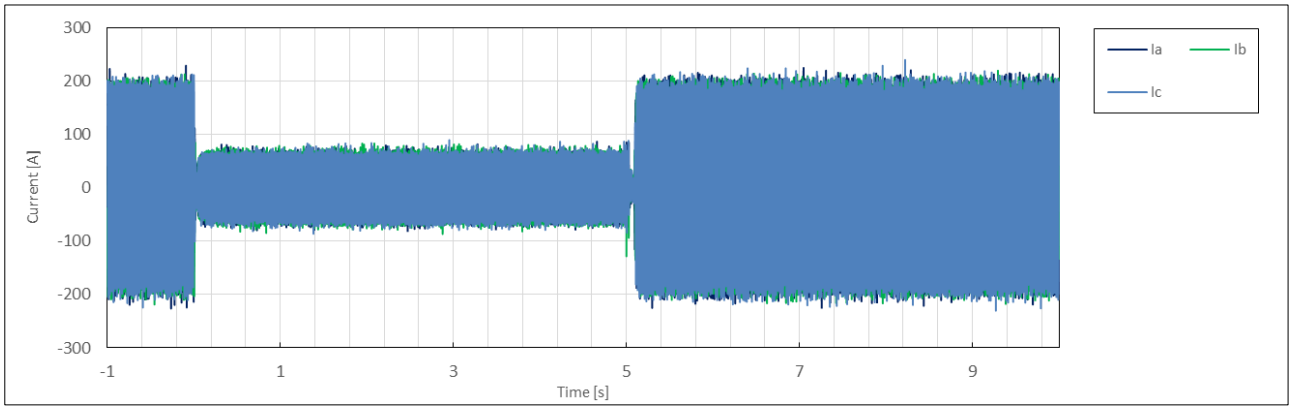
No. 7.5 Load Test

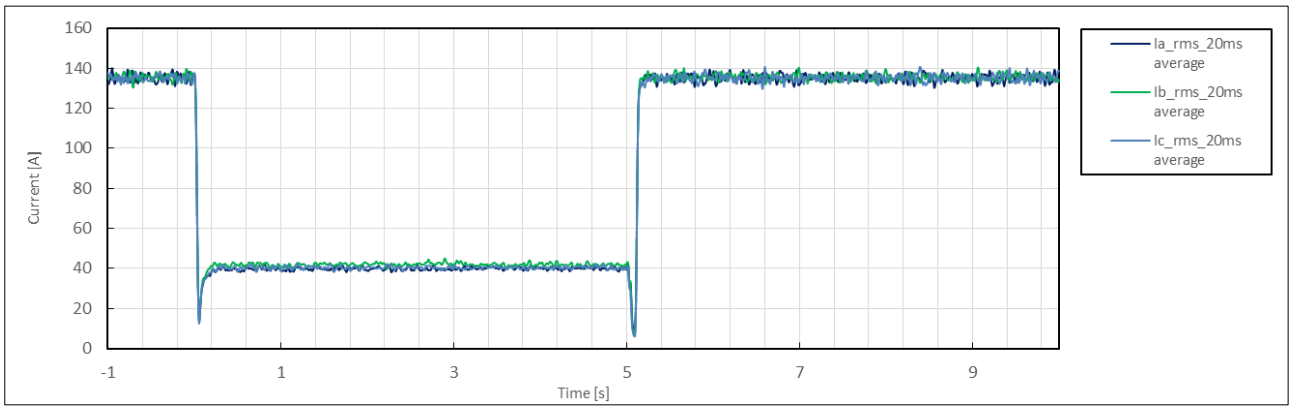


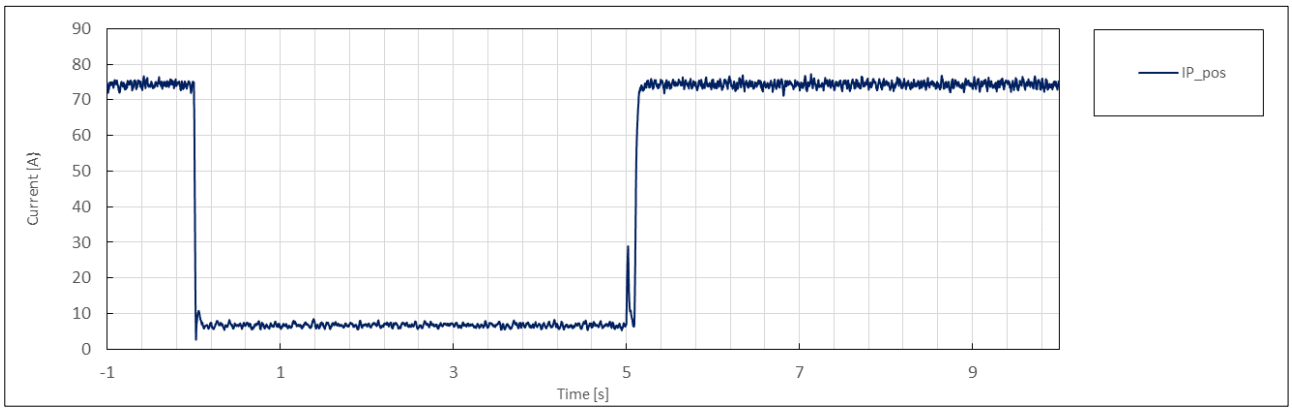


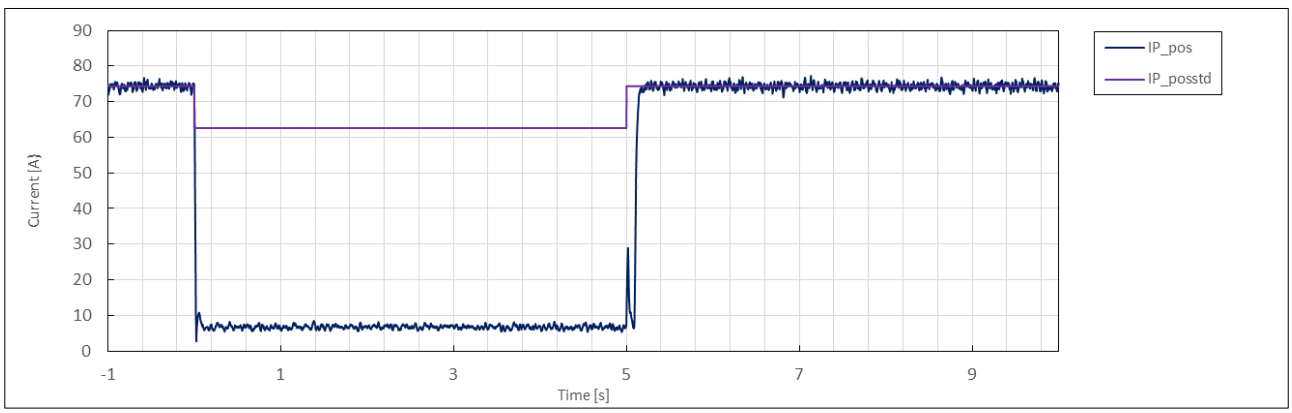


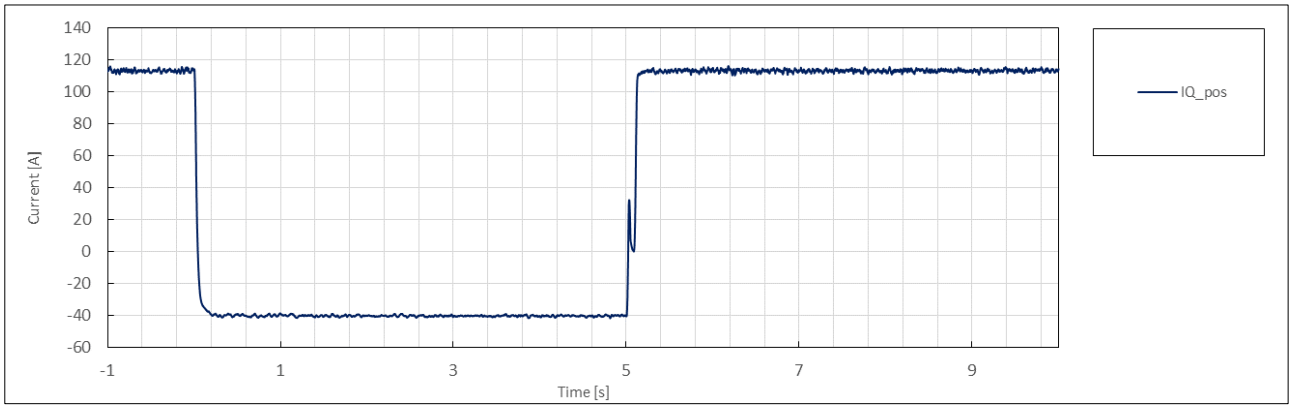


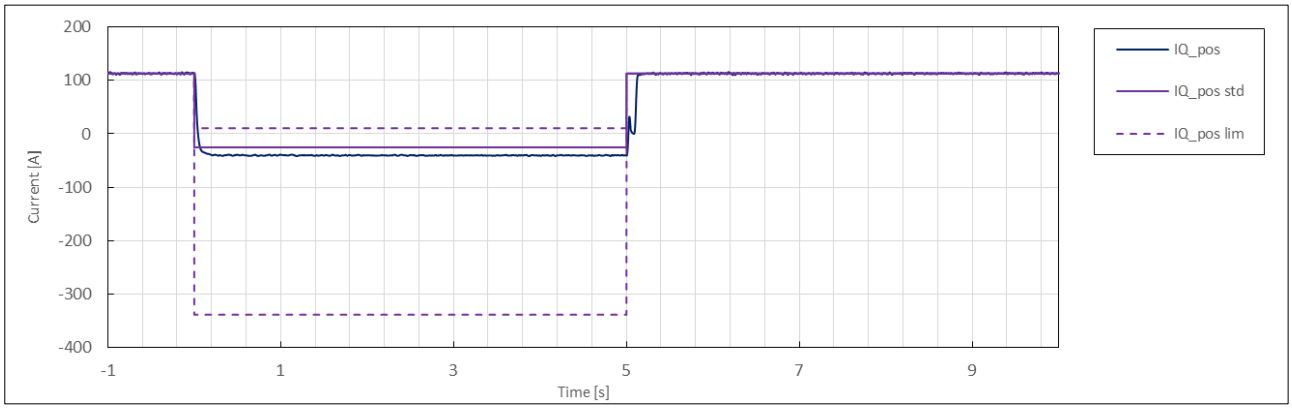

Current [A]
Time [s]
Ia
Ib
Ic

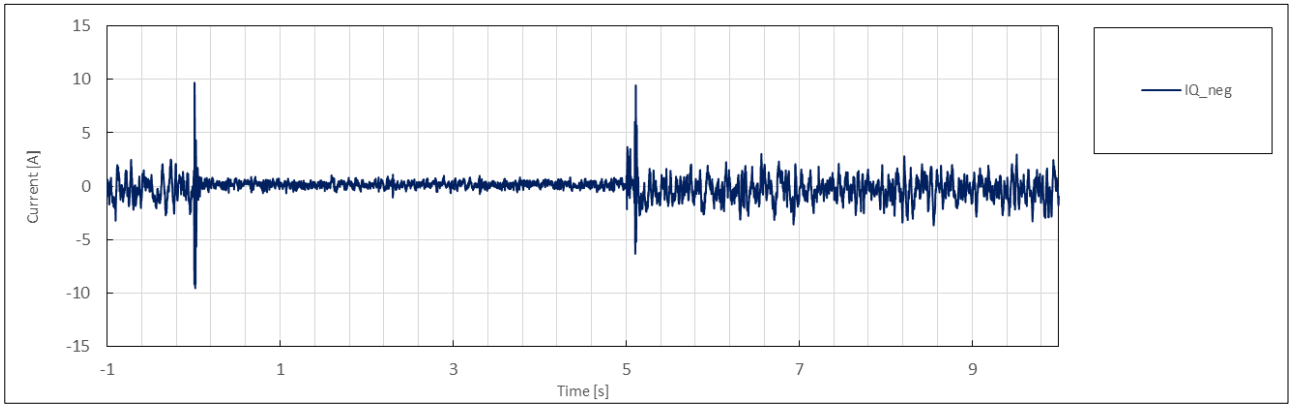

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

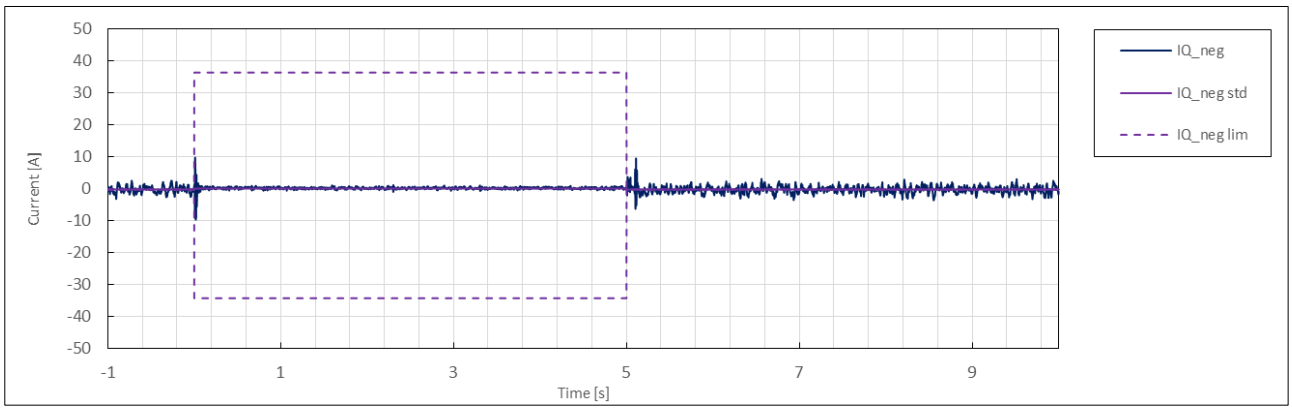

Current [A]
Time [s]
IP_pos

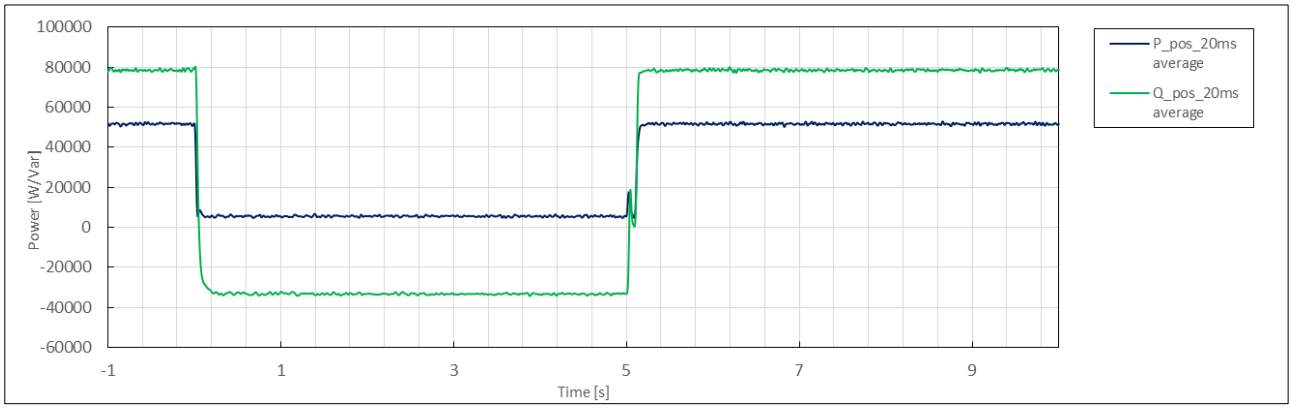

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

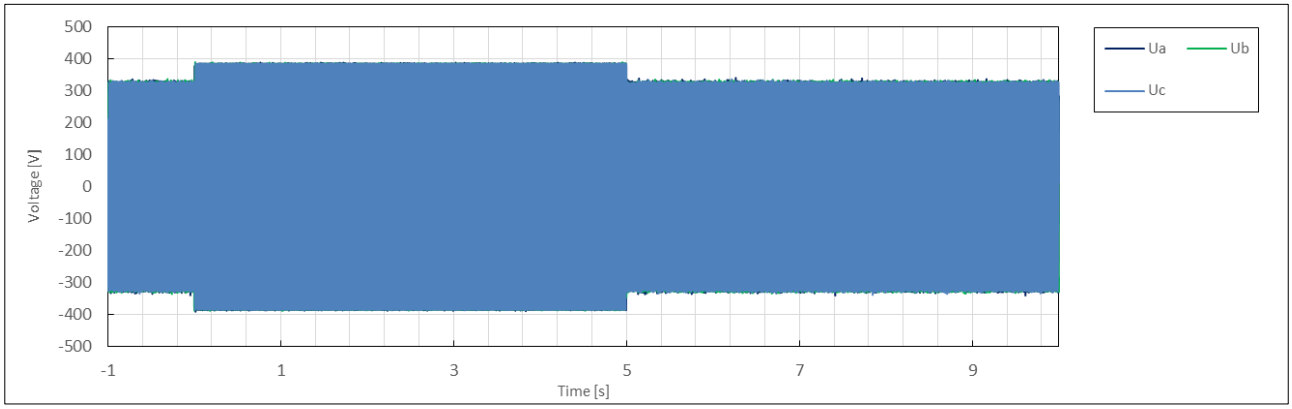

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

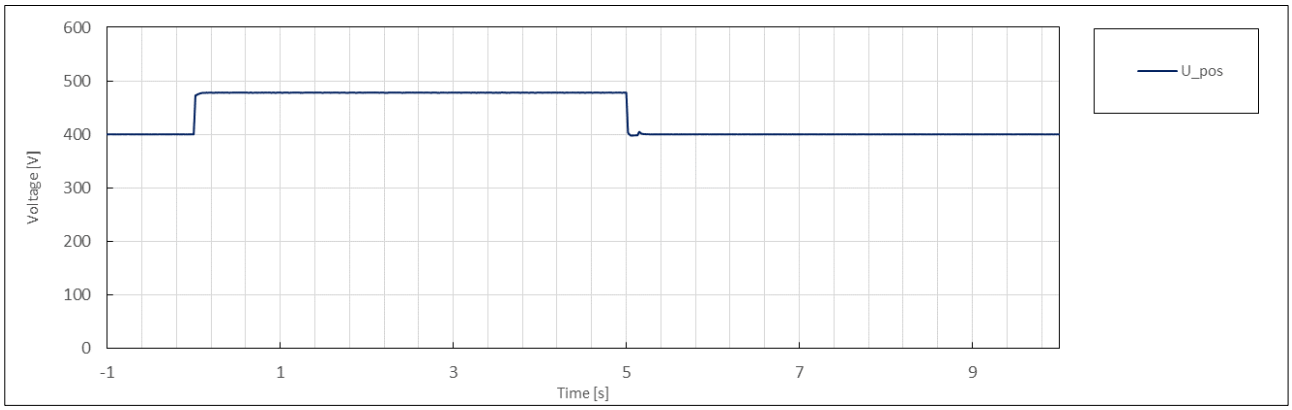

Current [A]
Time [s]
IQ_neg

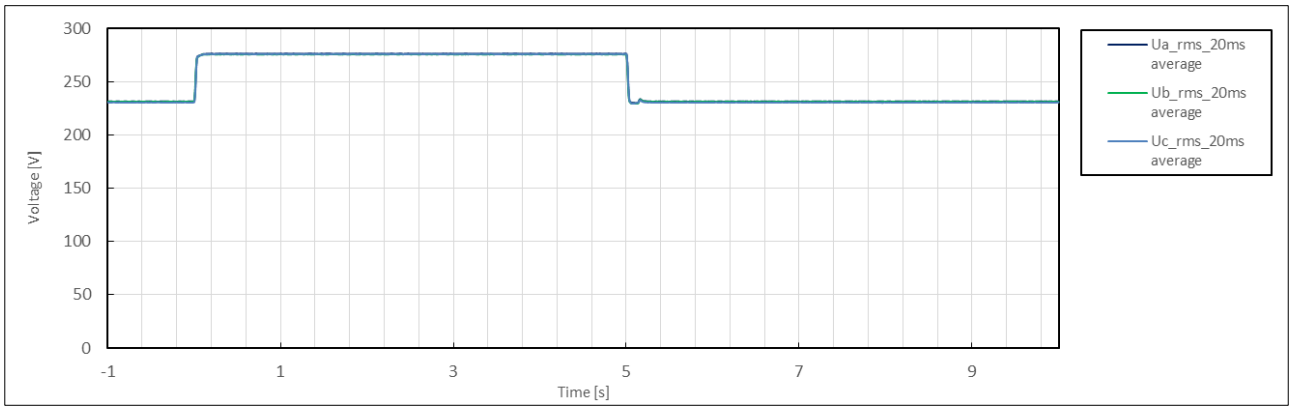

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


100000
80000
60000
40000
20000
0
-20000
-40000
-60000
Power [W/Var]
-1
1
3
5
7
9
Time [s]
P_pos_20ms average
Q_pos_20ms average

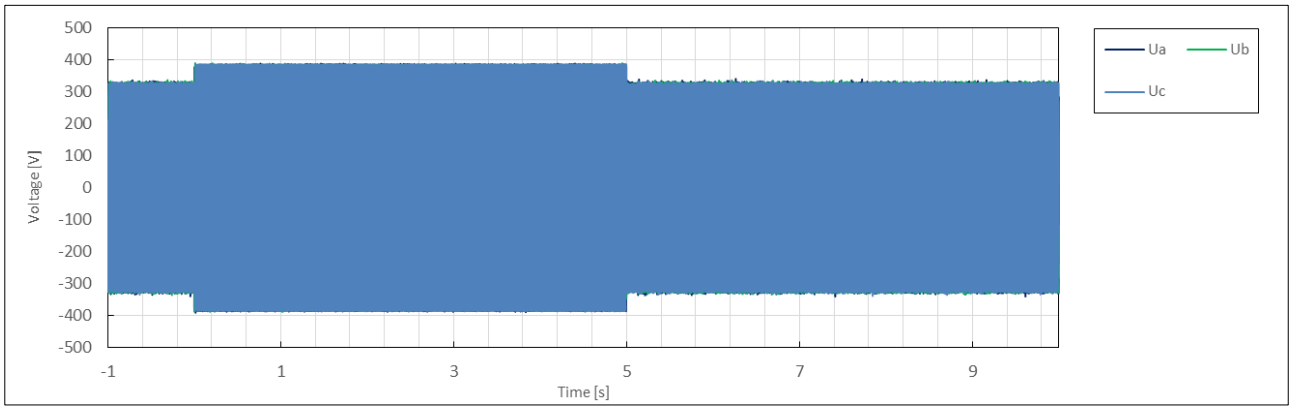
No. 7.6 Idle Test

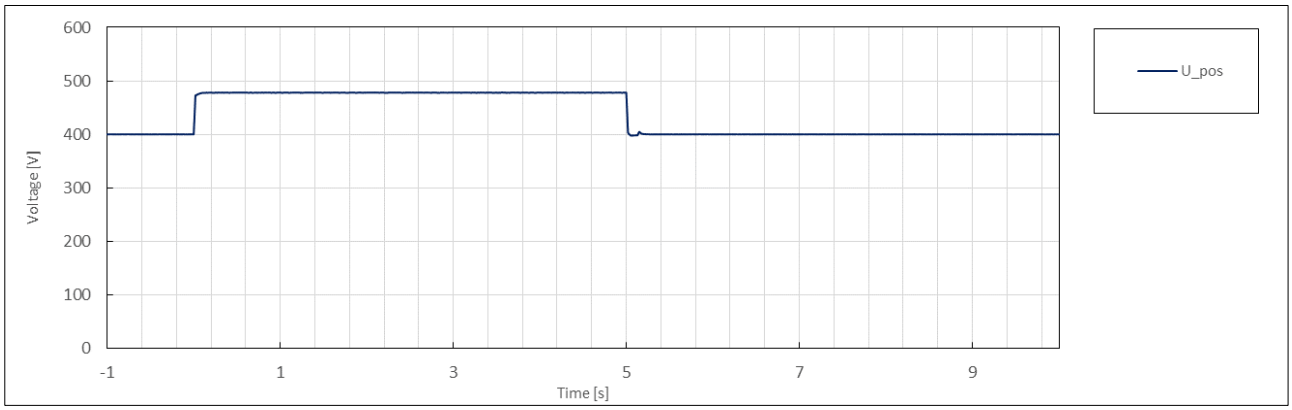


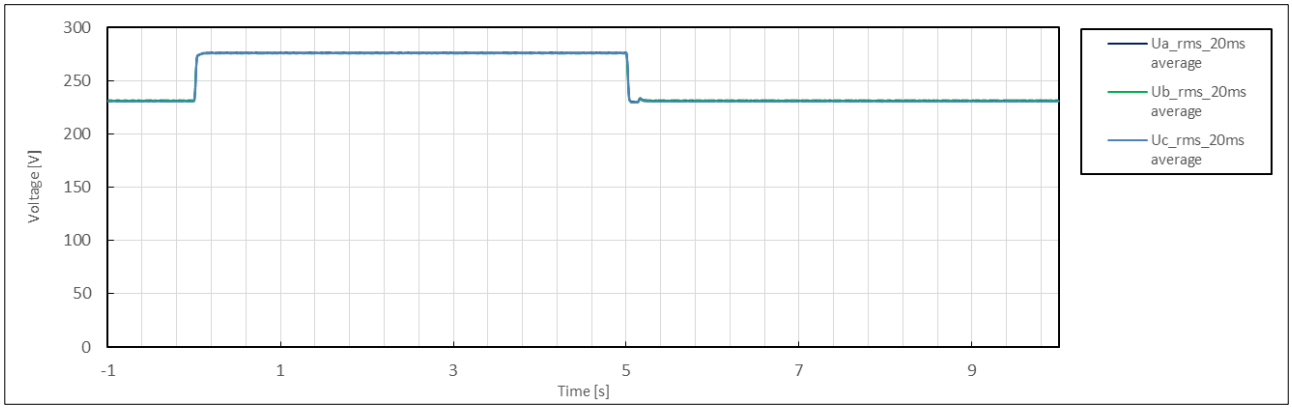


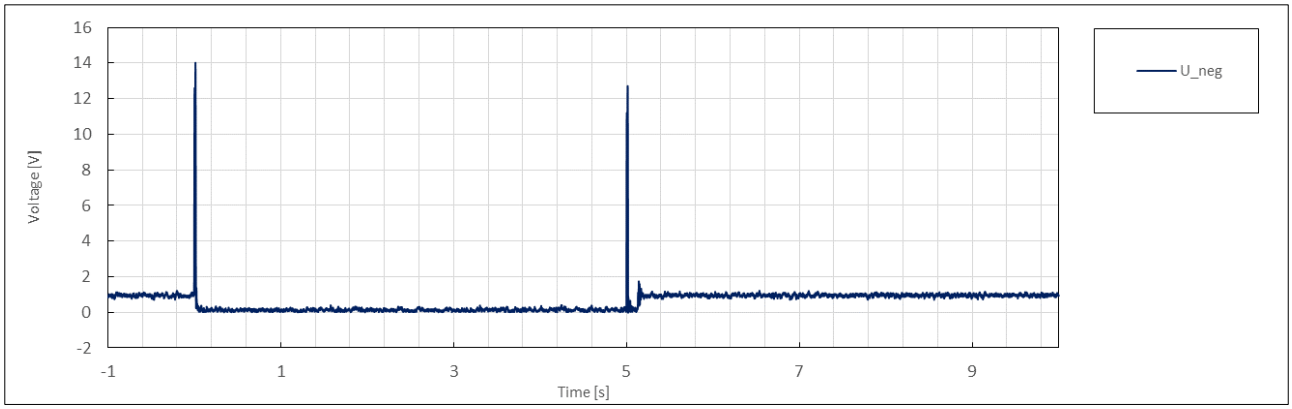


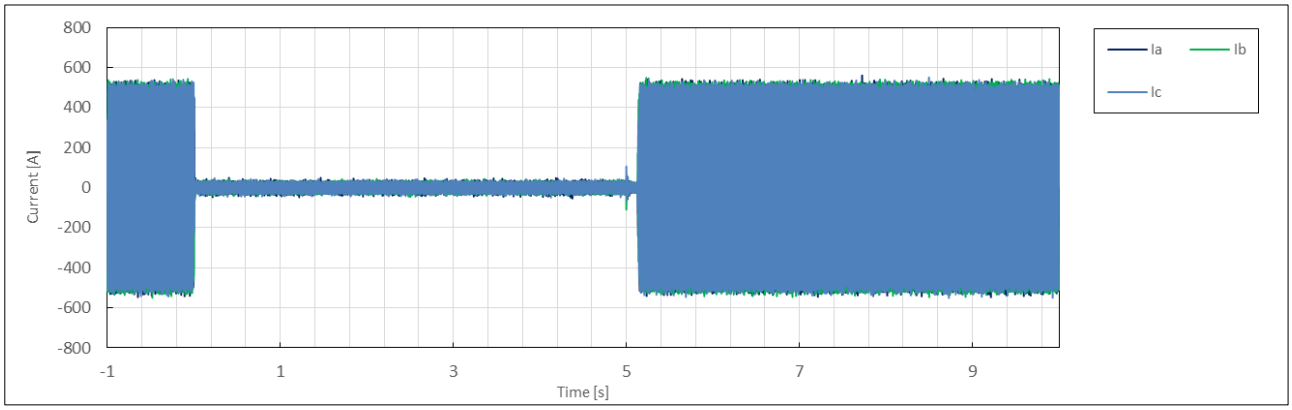
No. 7.6 Load Test

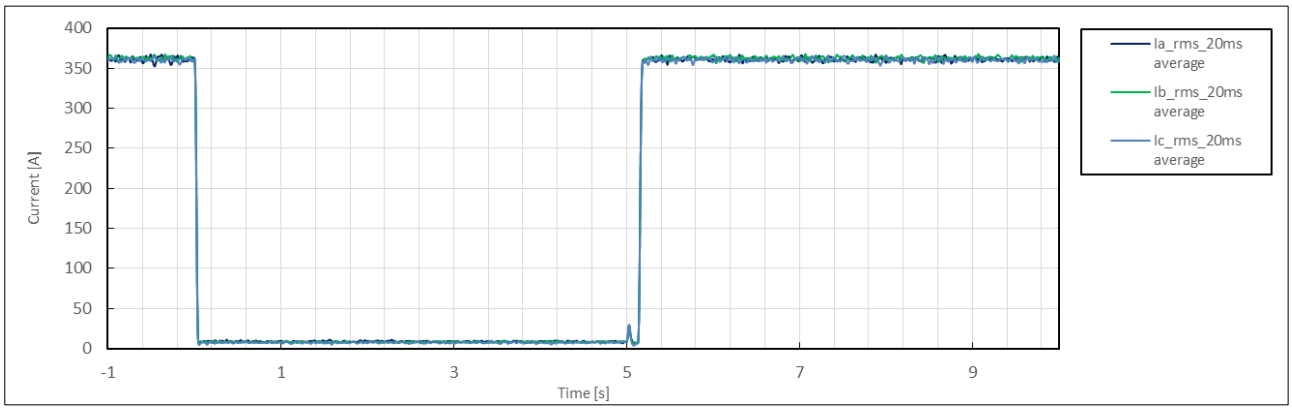


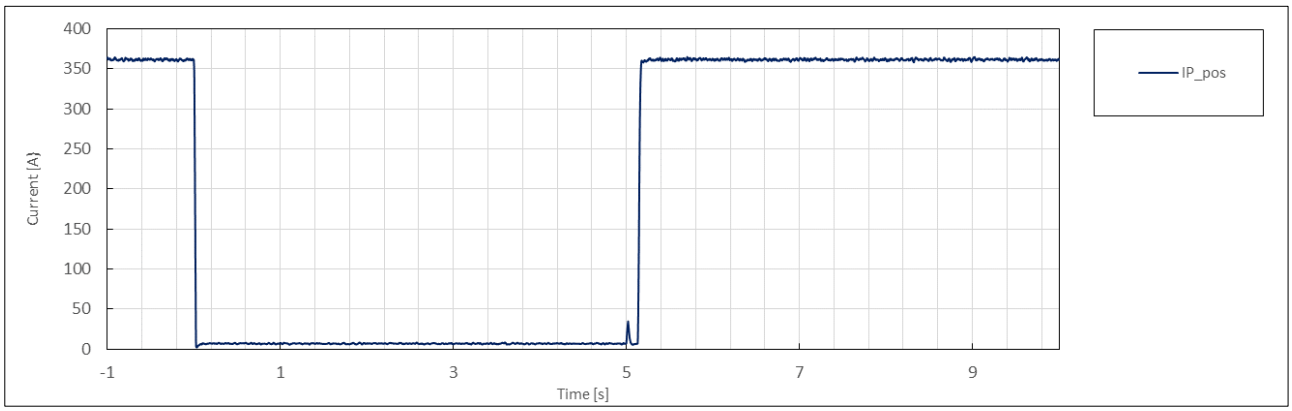


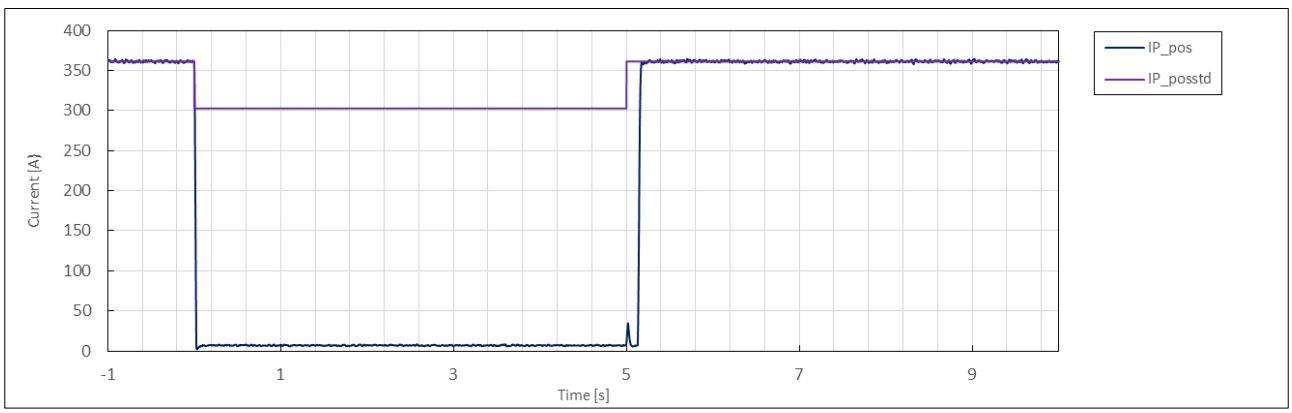


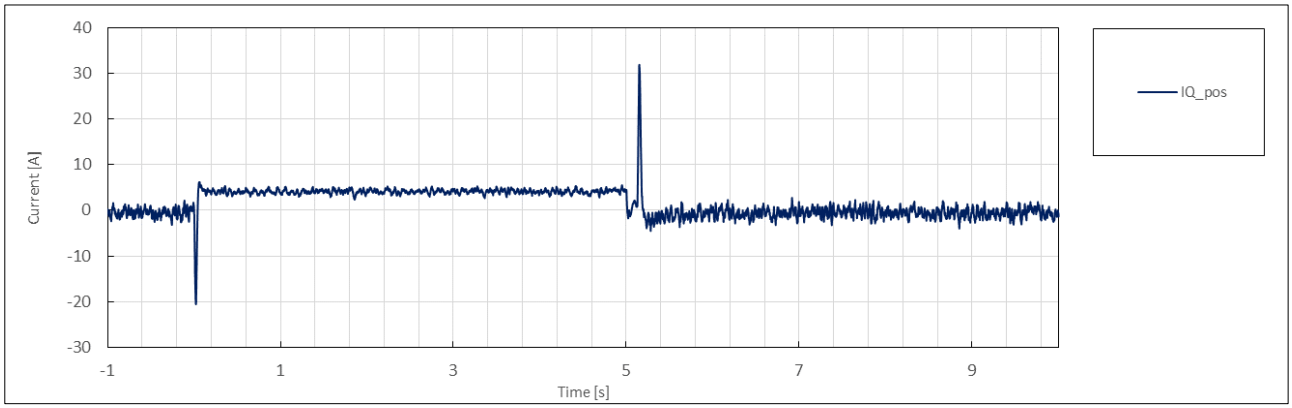


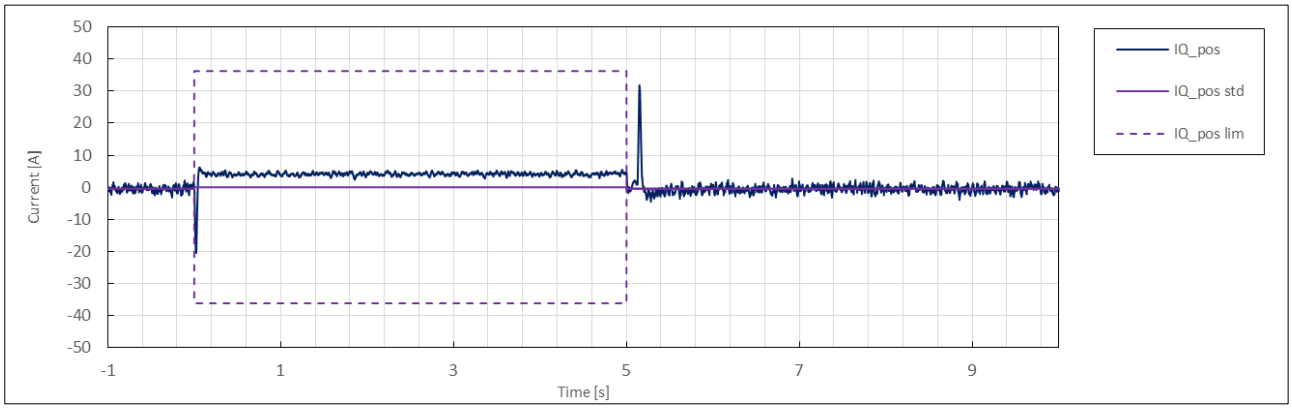

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
1
3
5
7
9
Time [s]
Ia
Ib
Ic

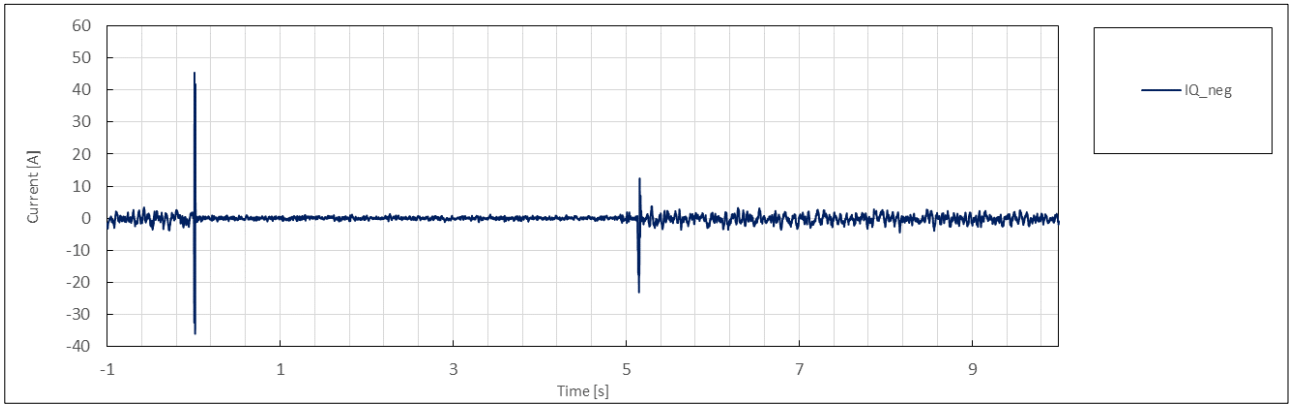

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

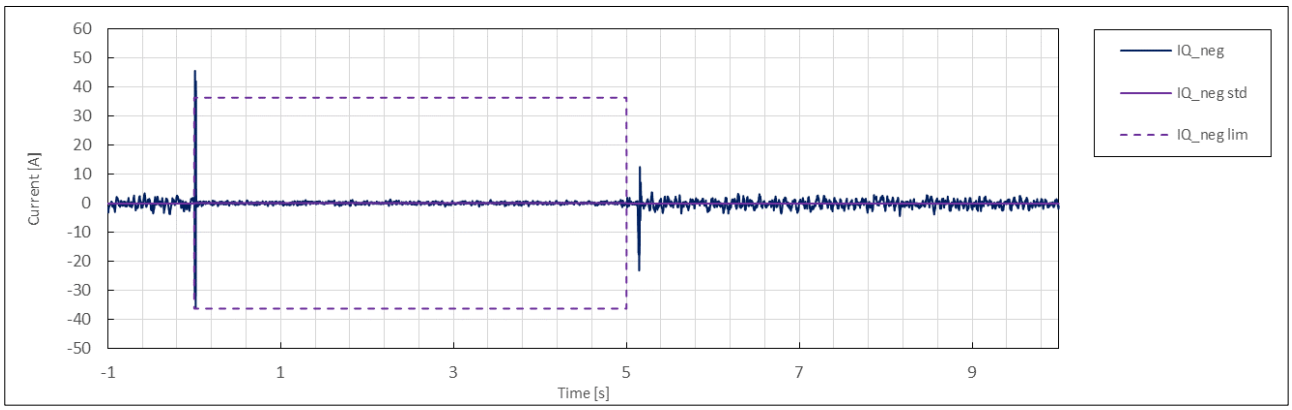

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
IP_pos

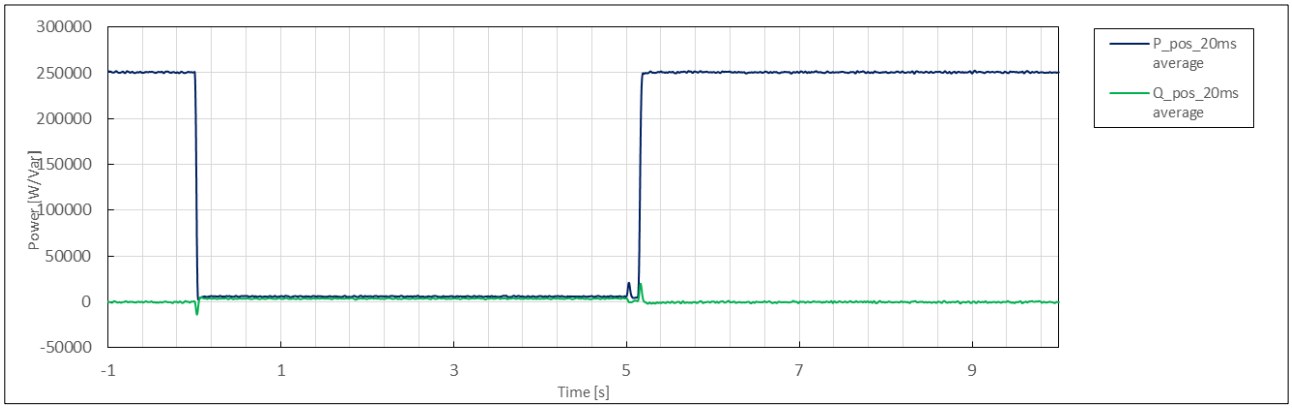

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

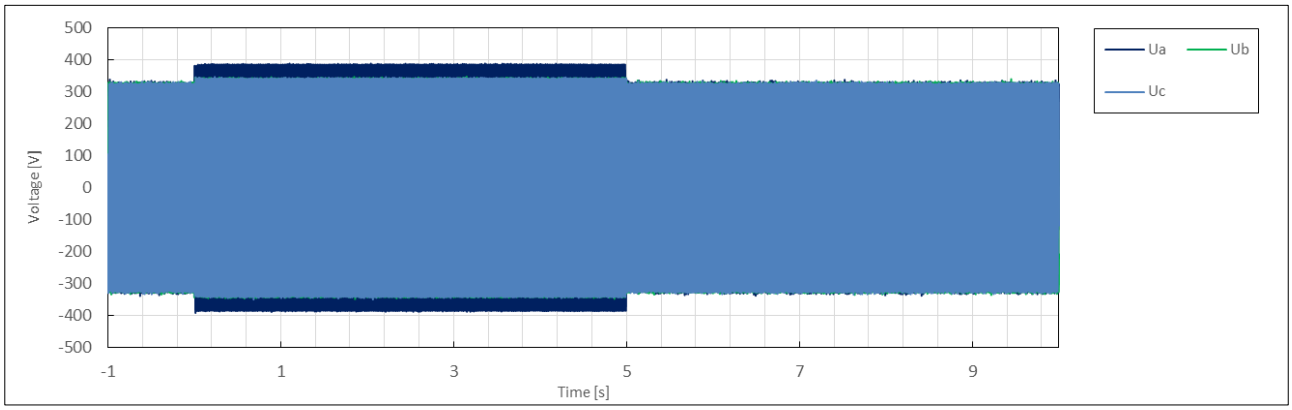

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

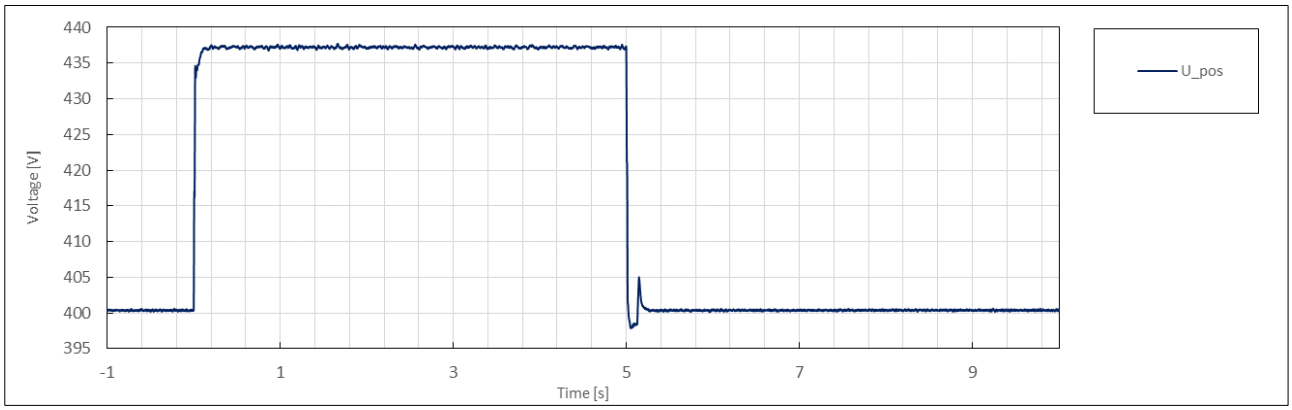

Current [A]
Time [s]
IQ_neg

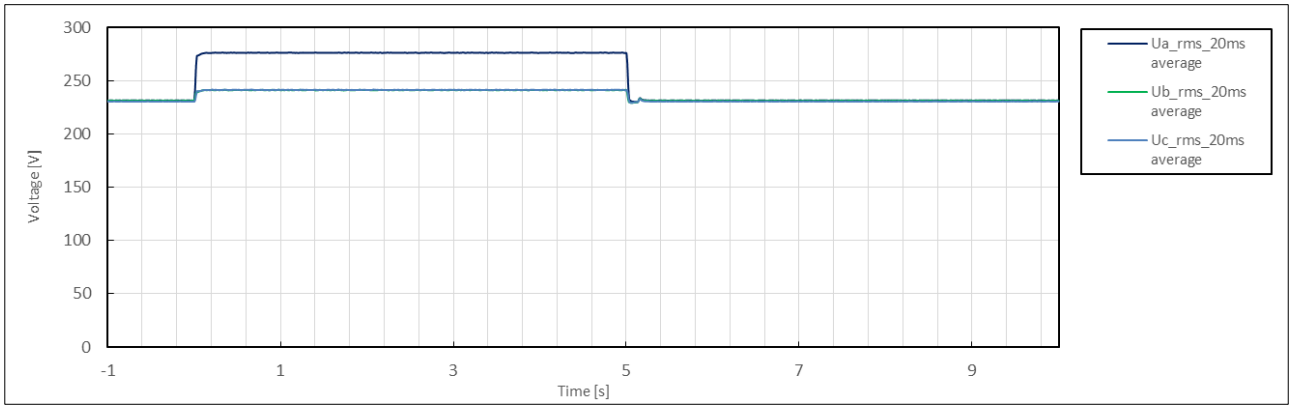

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
1
3
5
7
9
Time [s]
P_pos_20ms average
Q_pos_20ms average

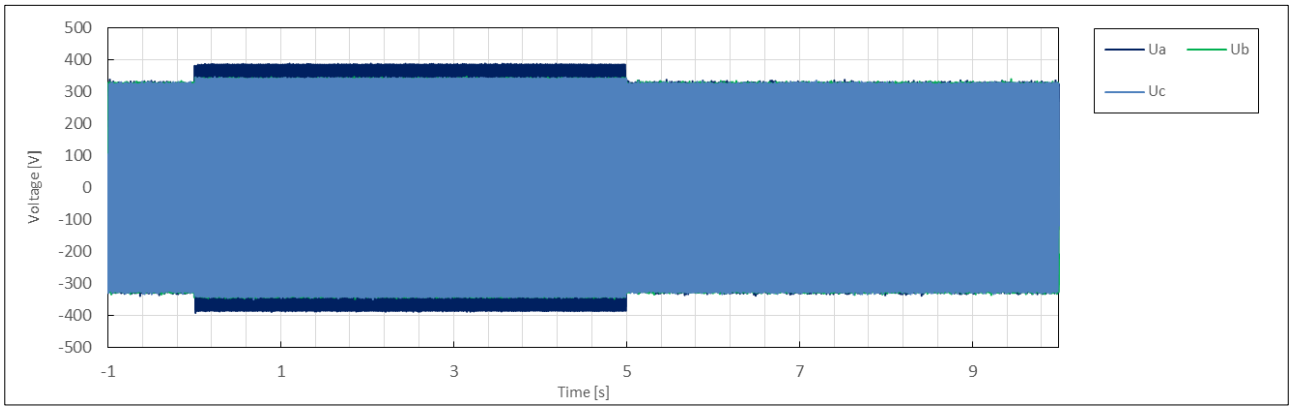
No. 7.7 Idle Test

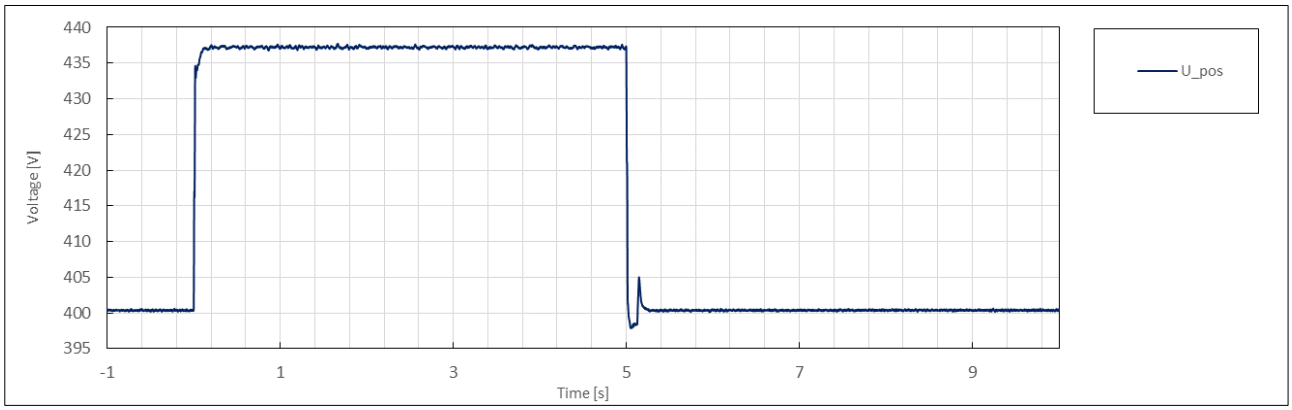


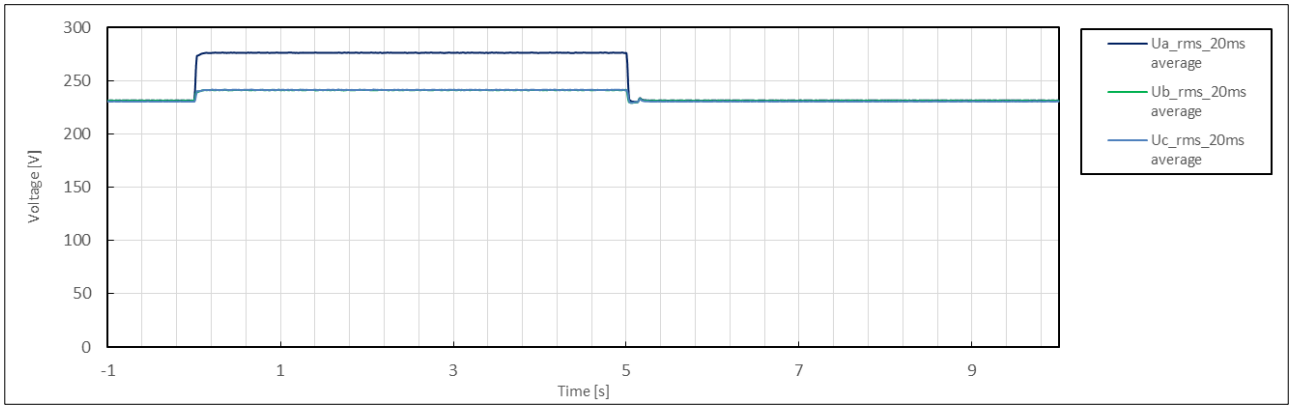


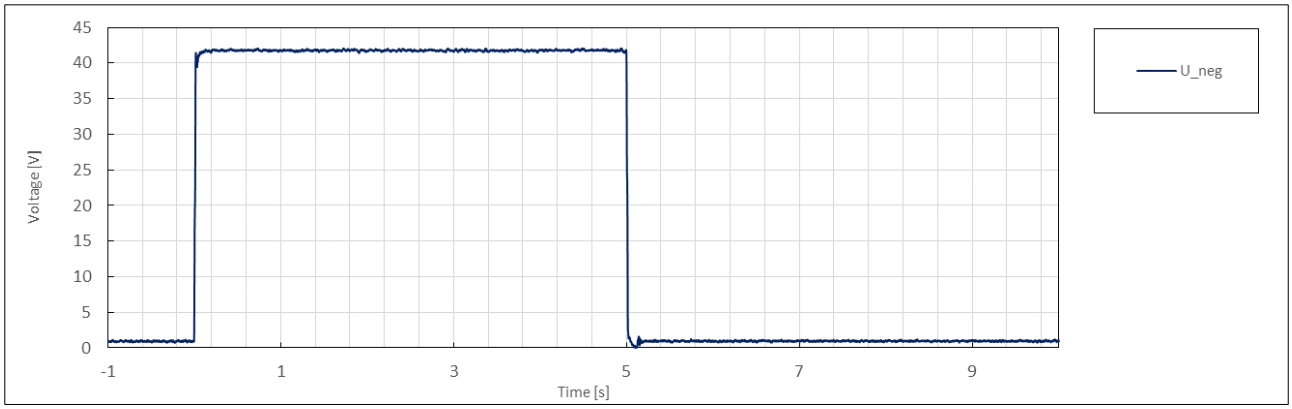


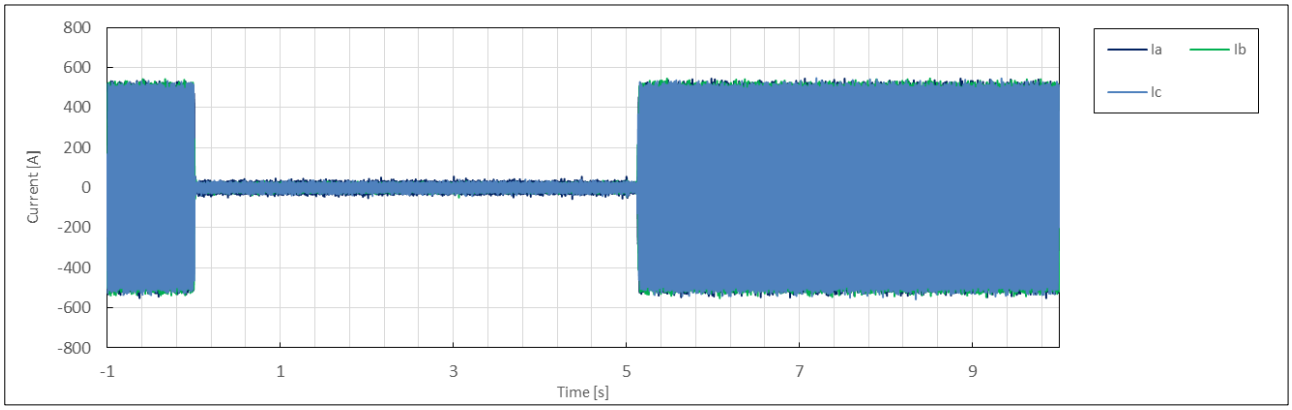
No. 7.7 Load Test

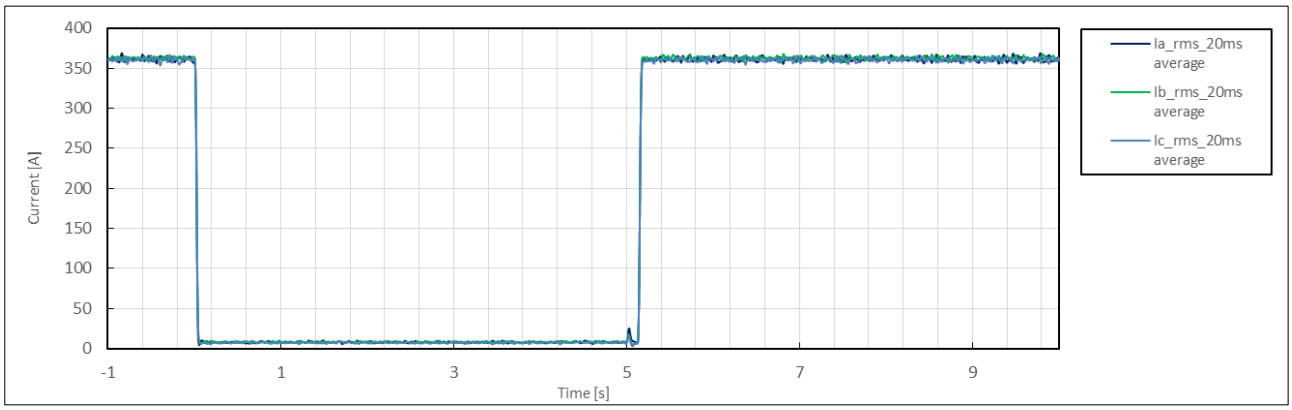


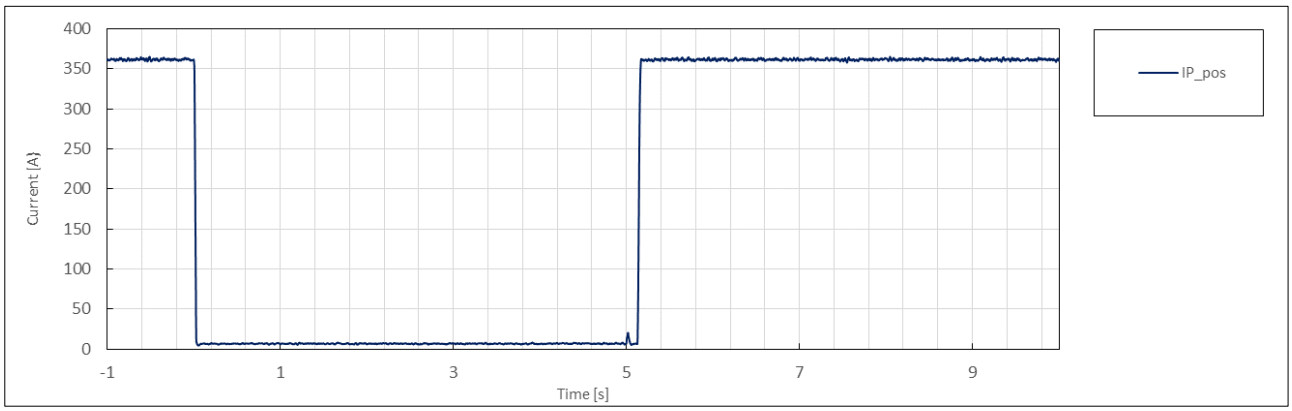


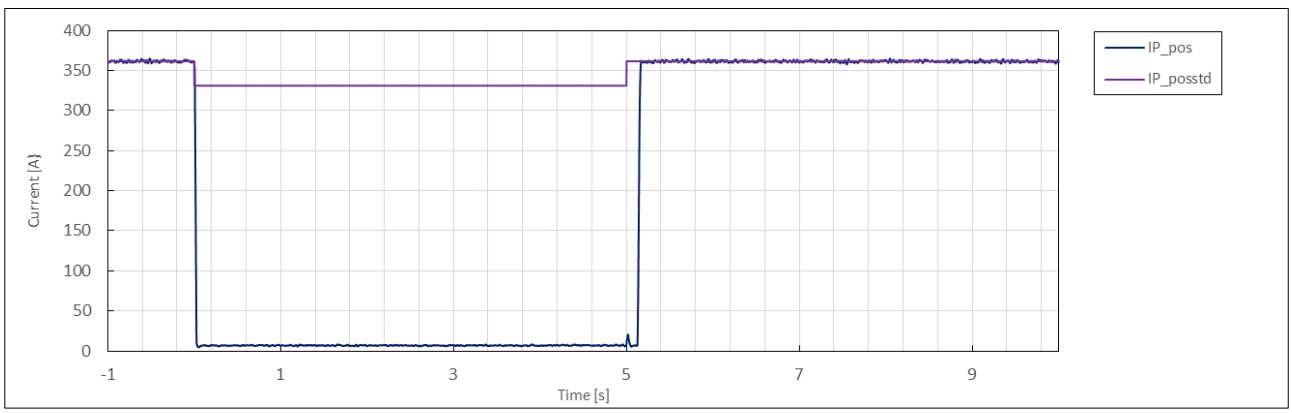


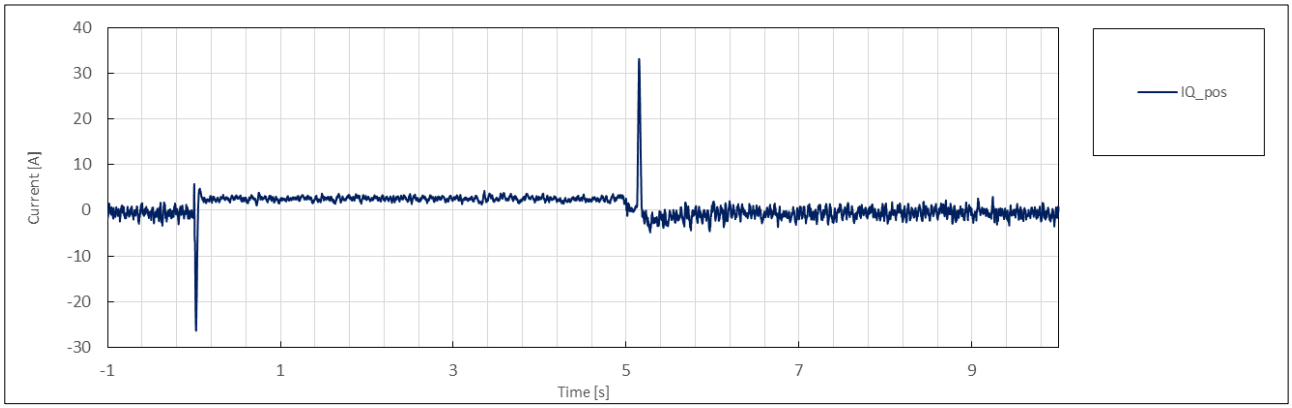


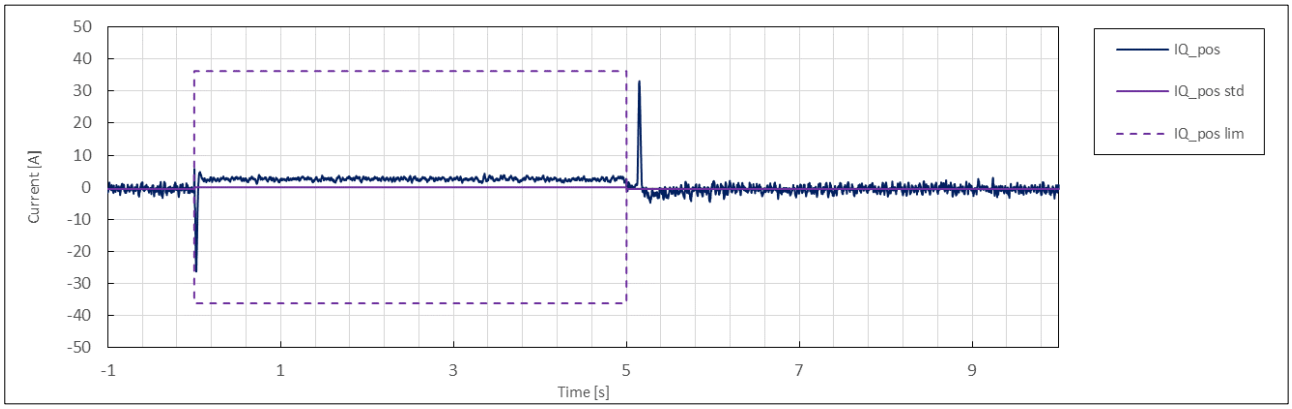

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
1
3
5
7
9
Time [s]
Ia
Ib
Ic

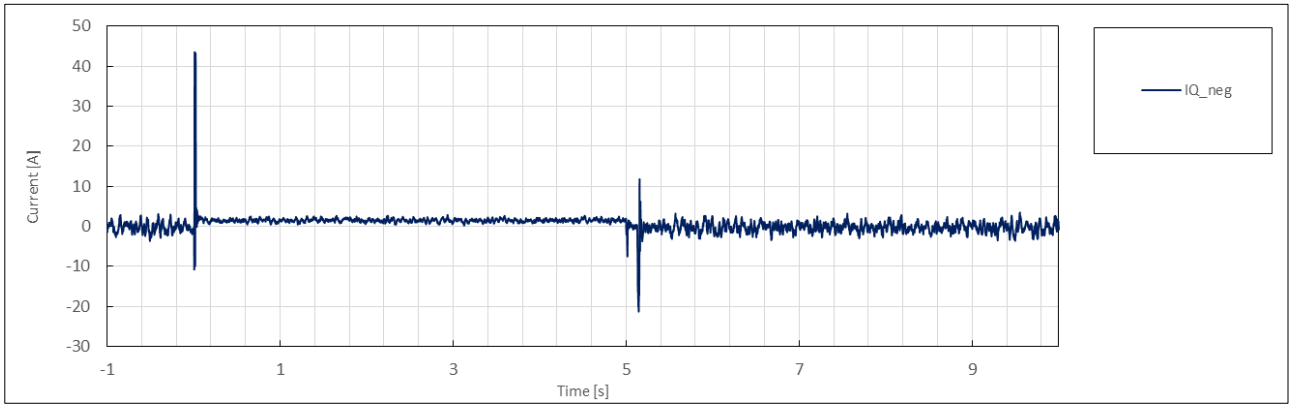

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

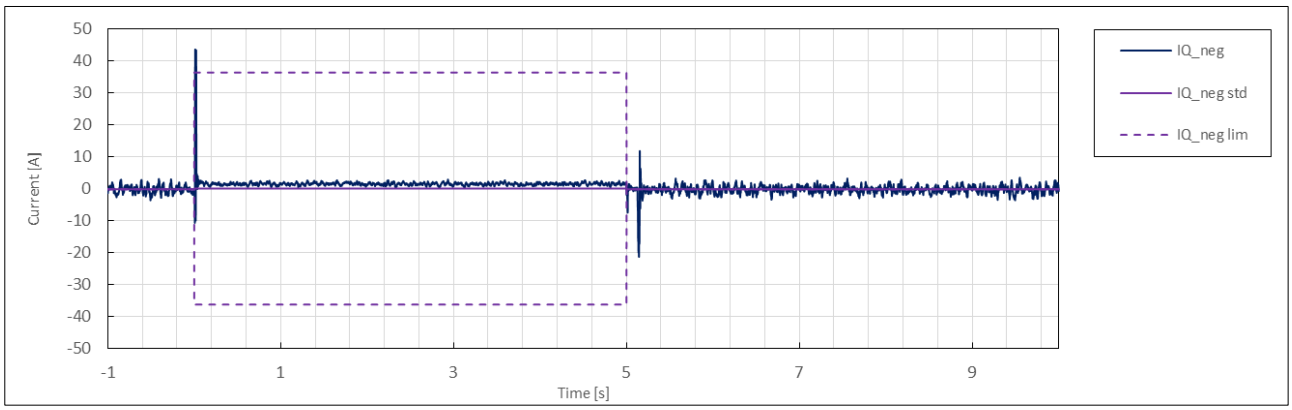

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
IP_pos

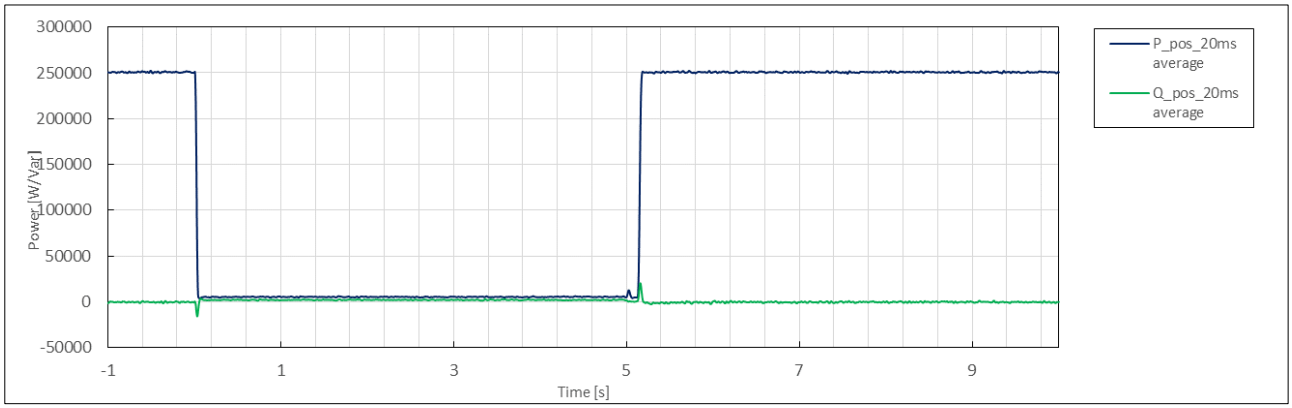

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

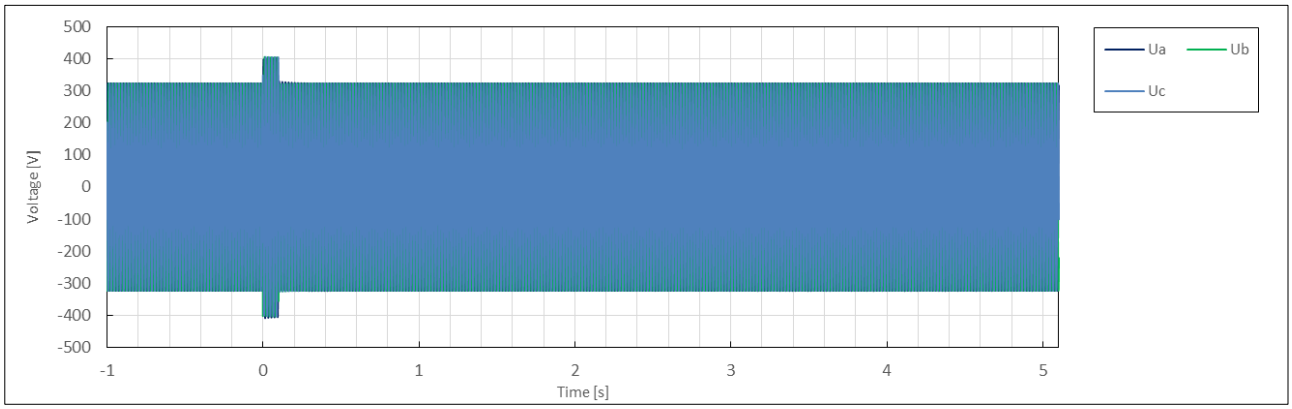

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

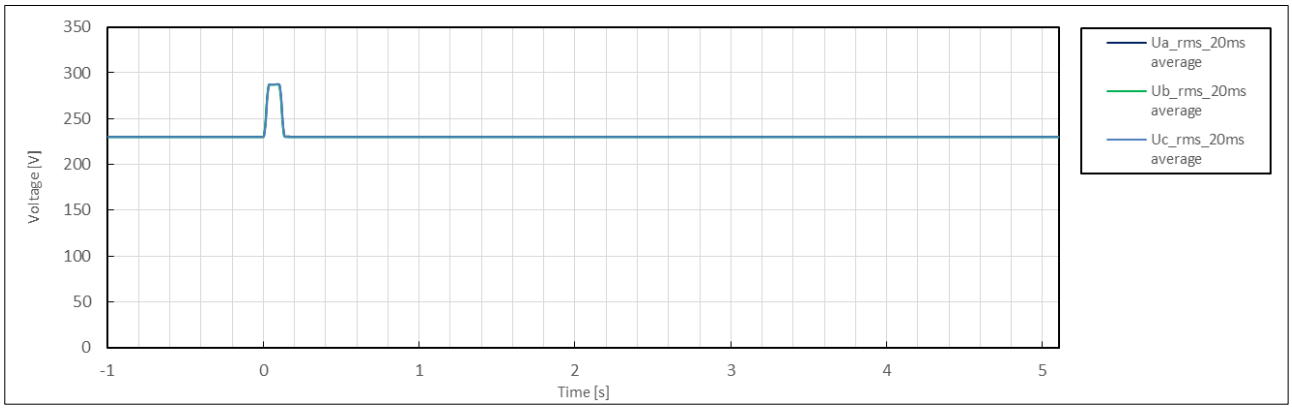

Current [A]
Time [s]
IQ_neg

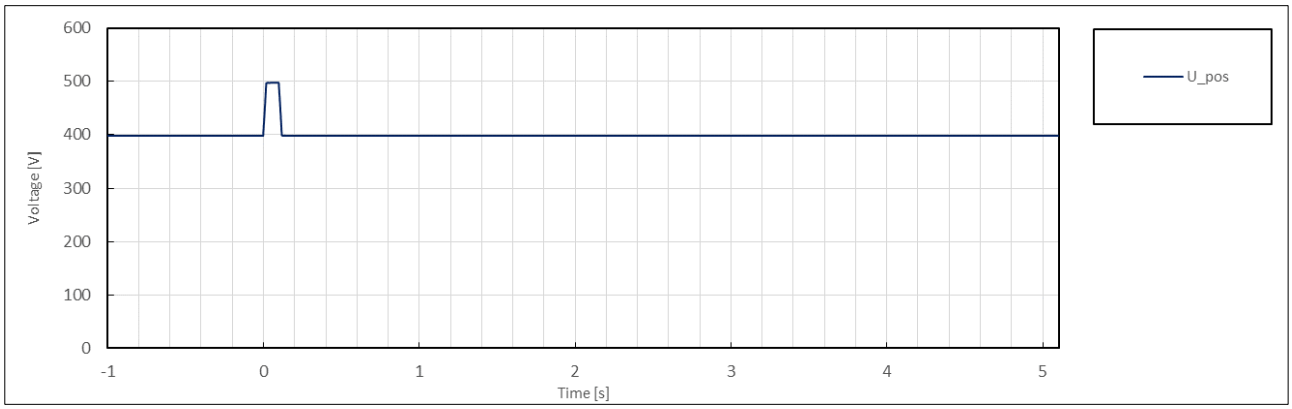

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
1
3
5
7
9
Time [s]
P_pos_20ms average
Q_pos_20ms average

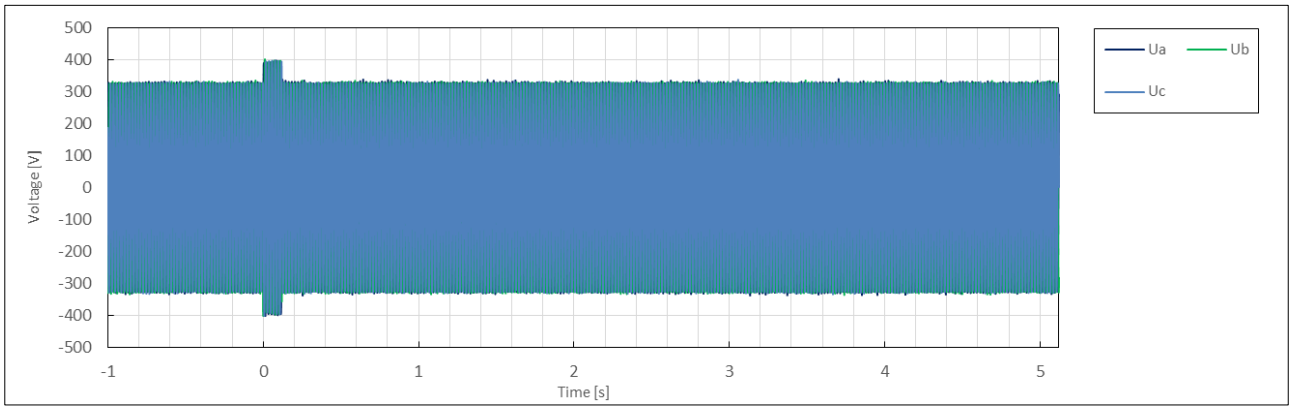
No. 8.1 Idle Test

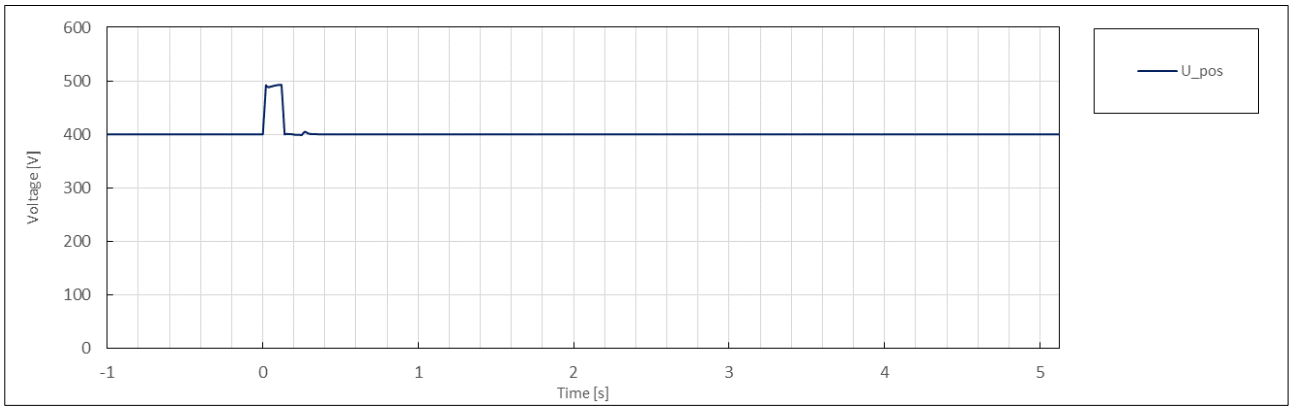


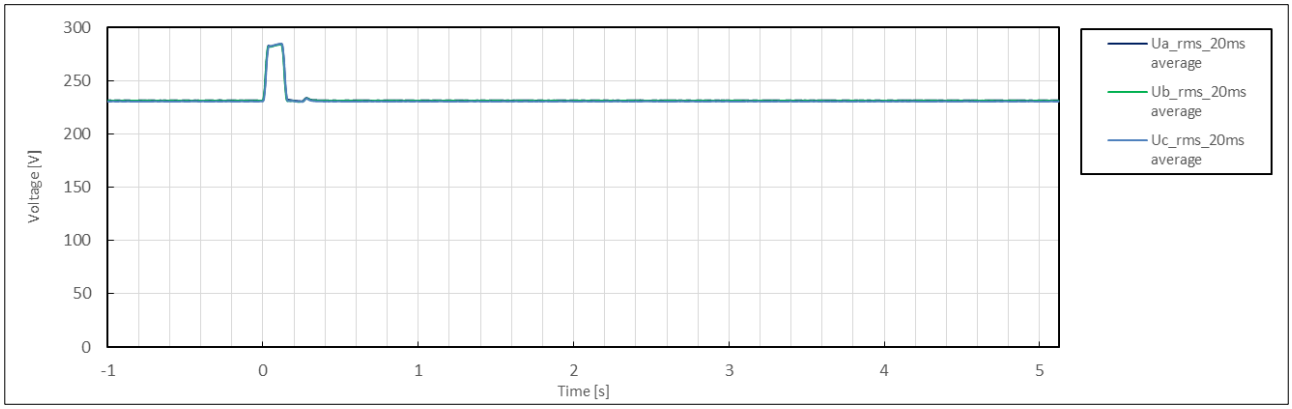


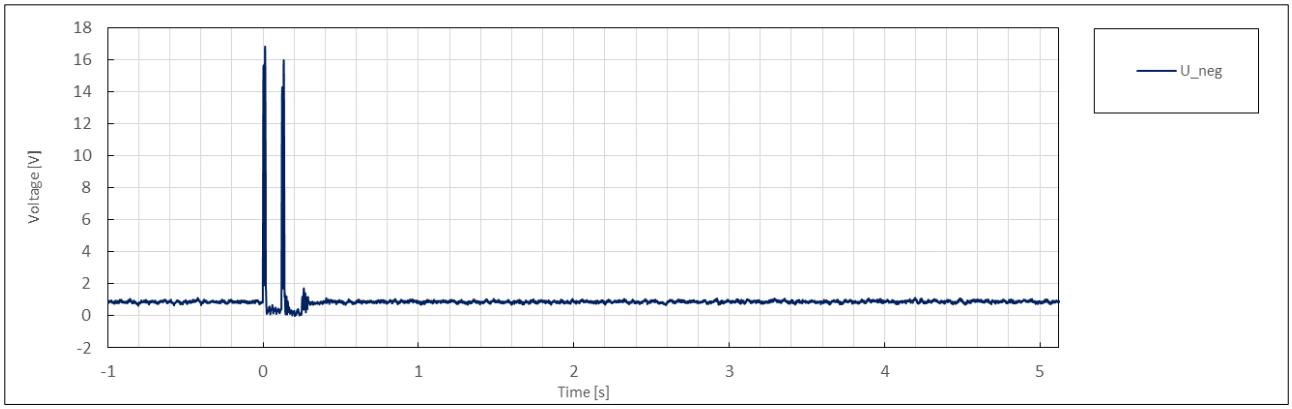


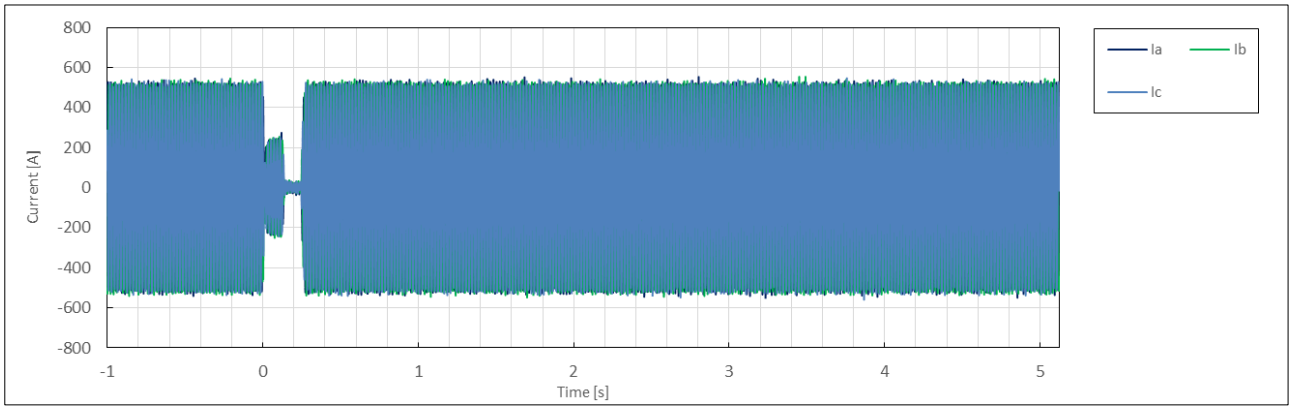
No. 8.1 Load Test

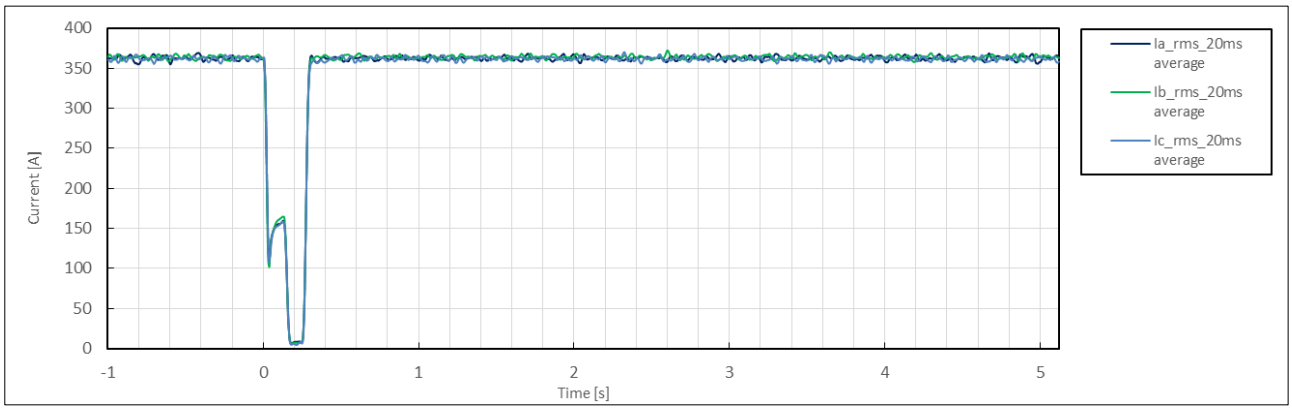


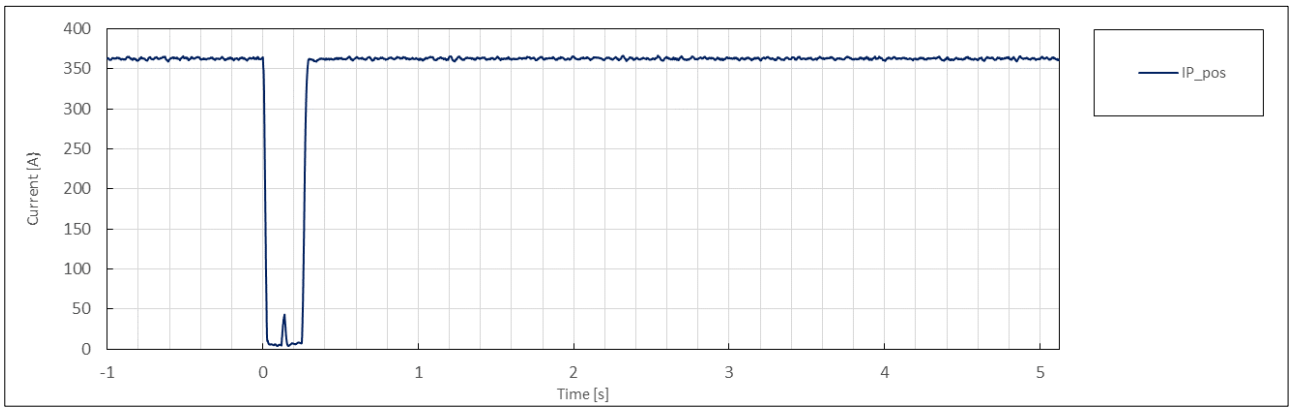


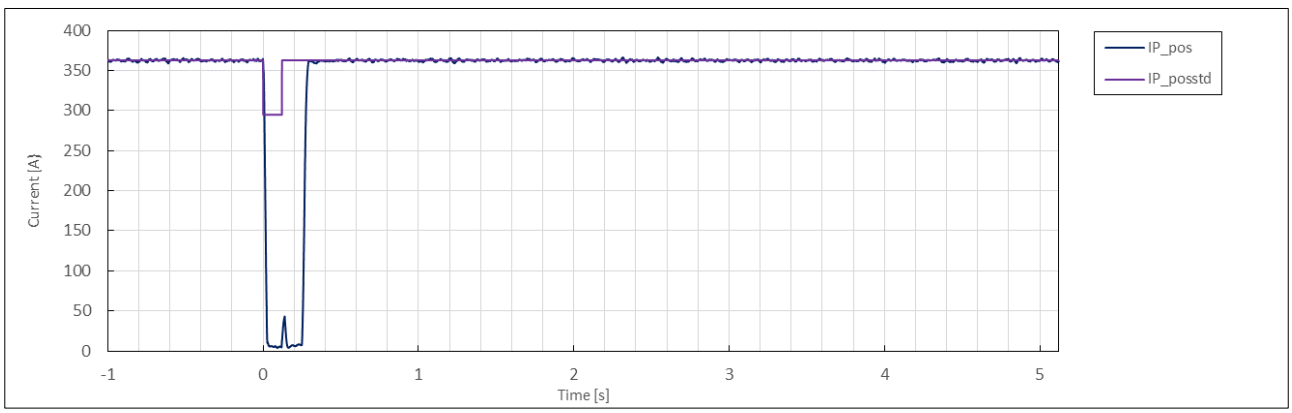


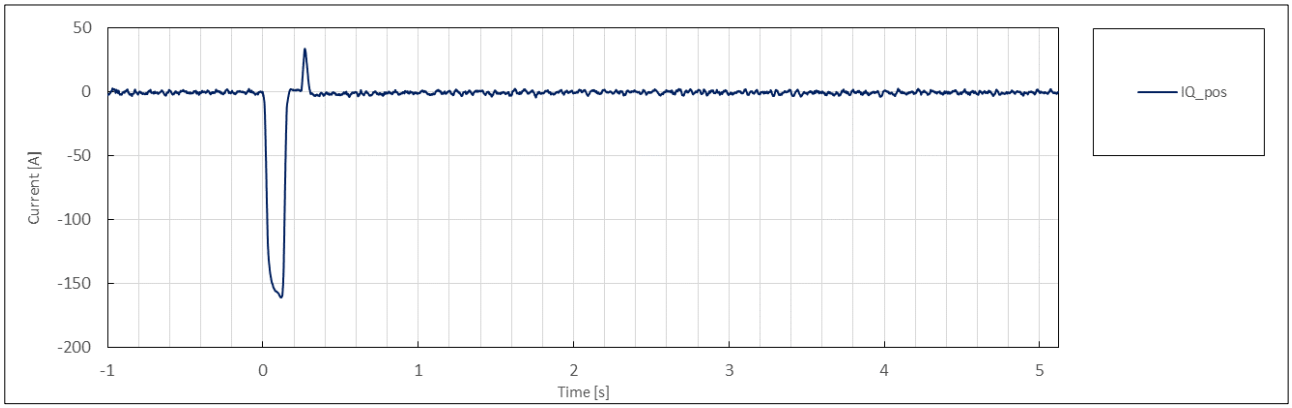


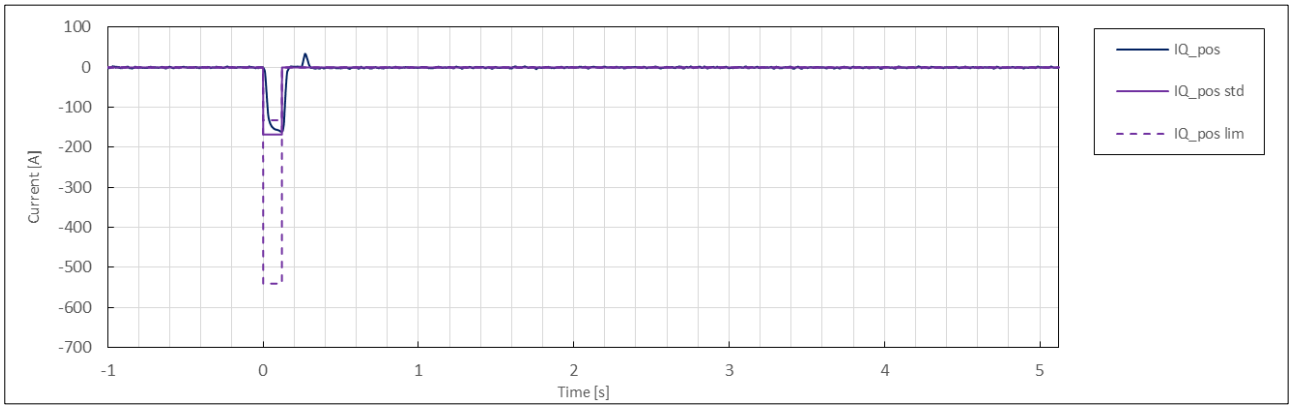

Current [A]
Time [s]
Ia
Ib
Ic

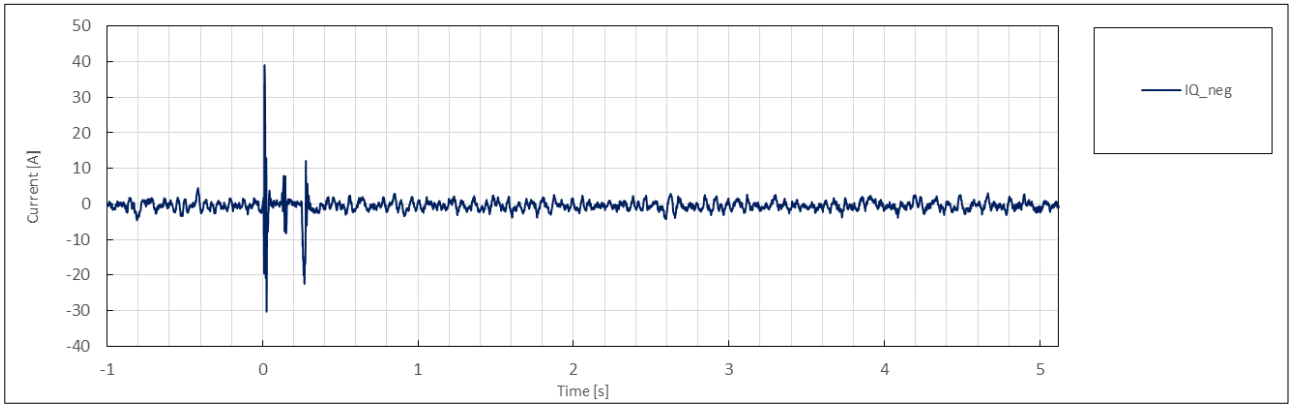

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

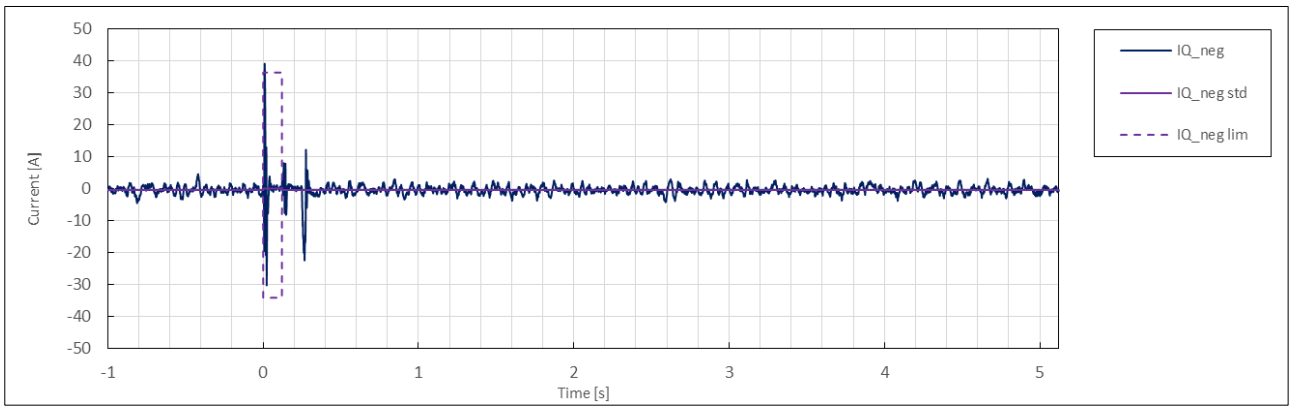

Current [A]
Time [s]
IP_pos

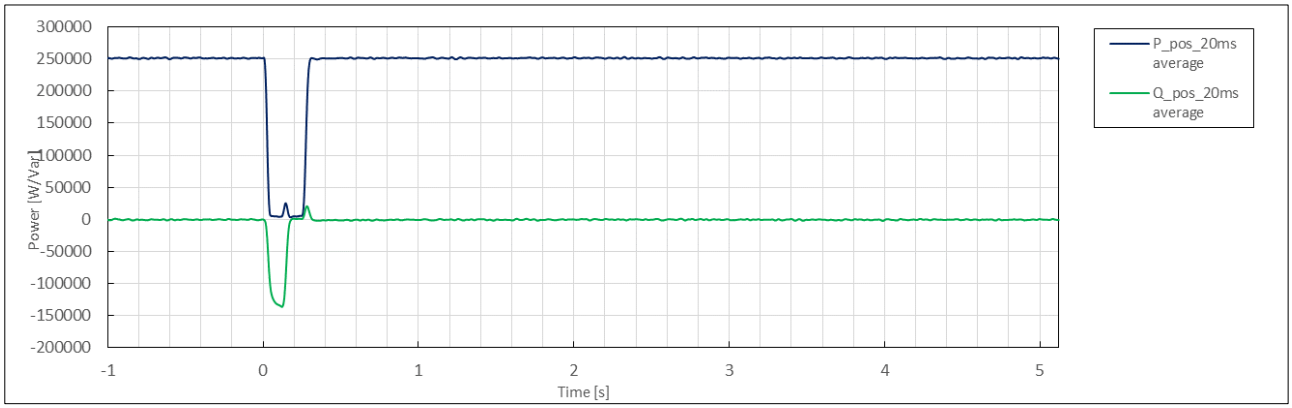

Current [A]
Time [s]
IP_pos
IP_posstd


50
0
-50
-100
-150
-200
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos

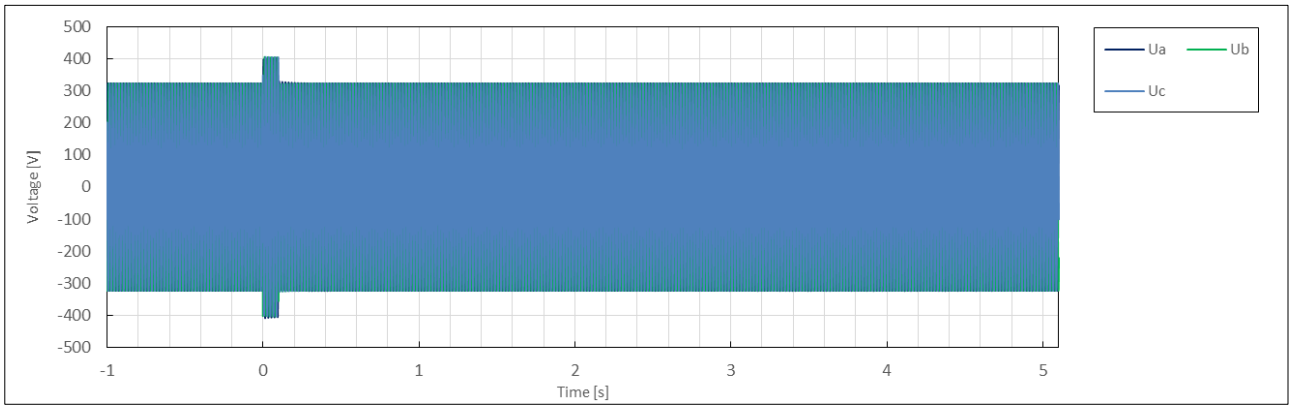

100
0
-100
-200
-300
-400
-500
-600
-700
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

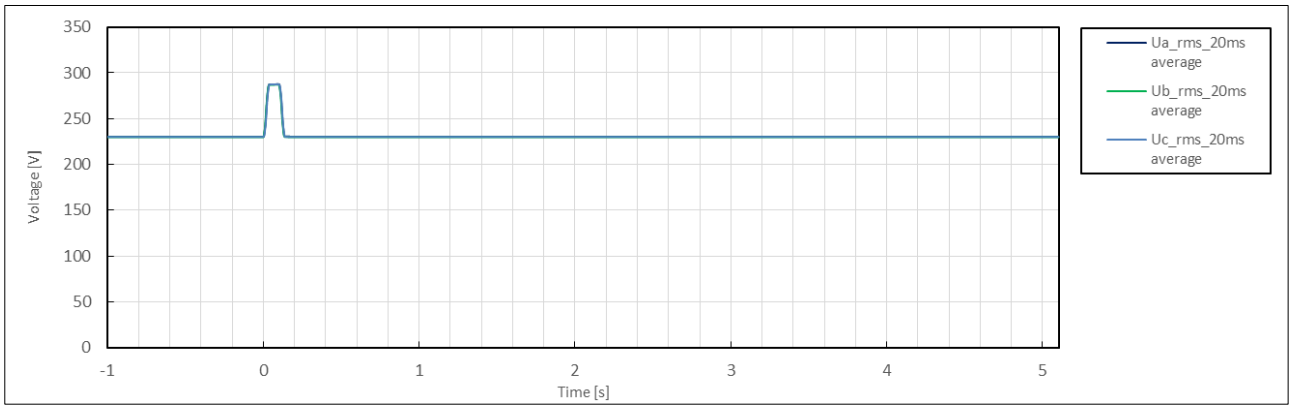

50
40
30
20
10
0
-10
-20
-30
-40
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg

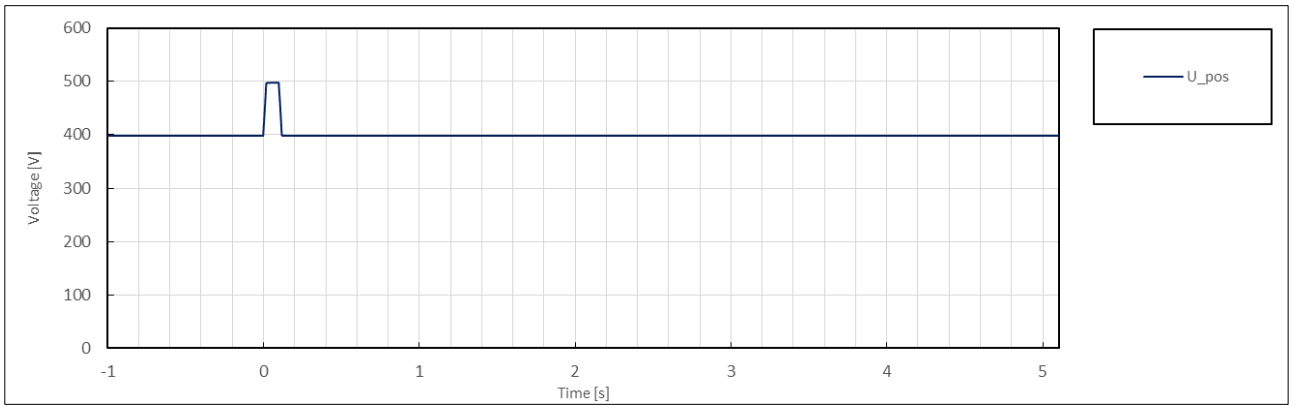

50
40
30
20
10
0
-10
-20
-30
-40
-50
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
-150000
-200000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

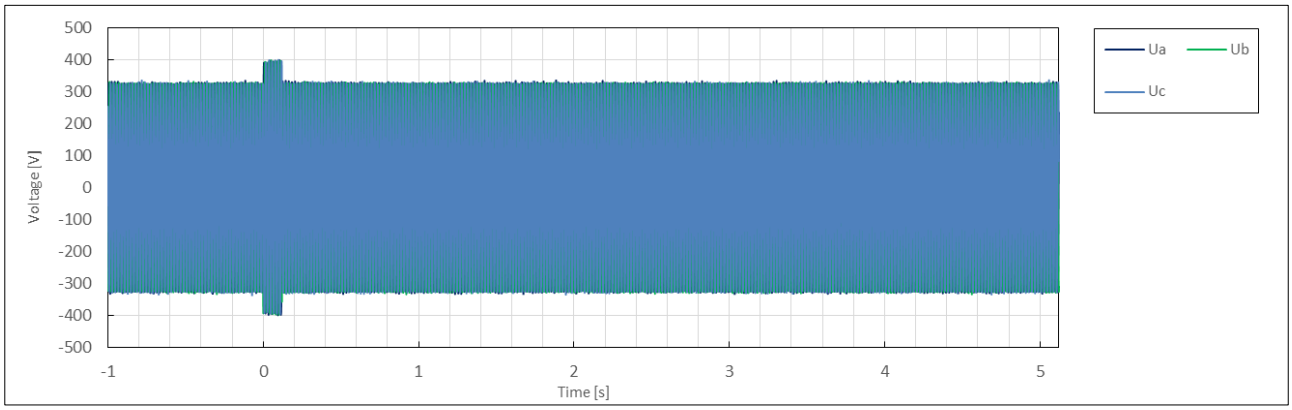
No. 8.2 Idle Test

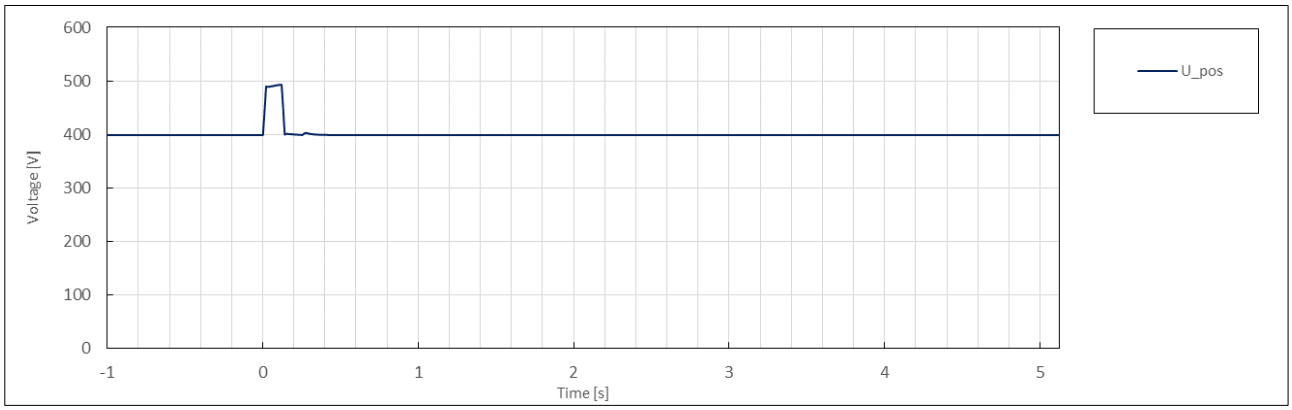


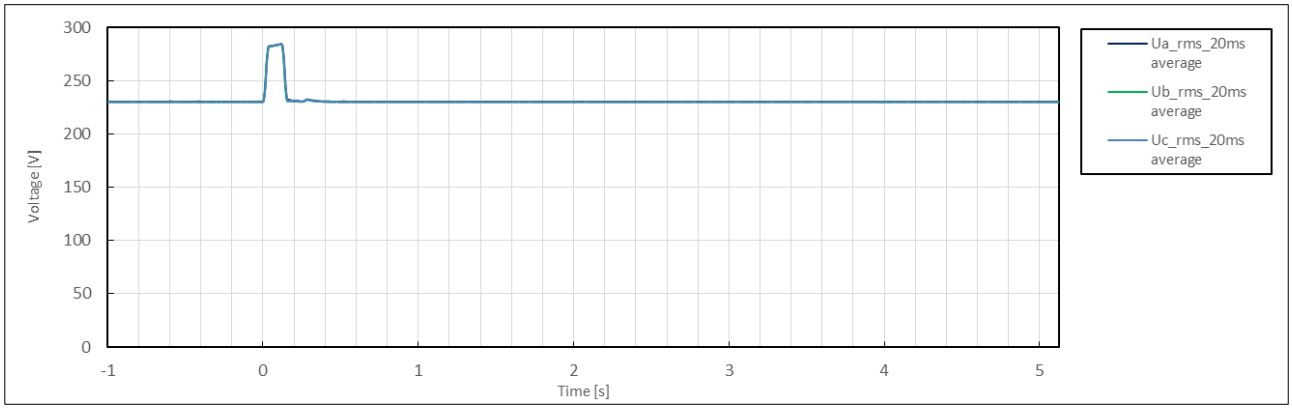


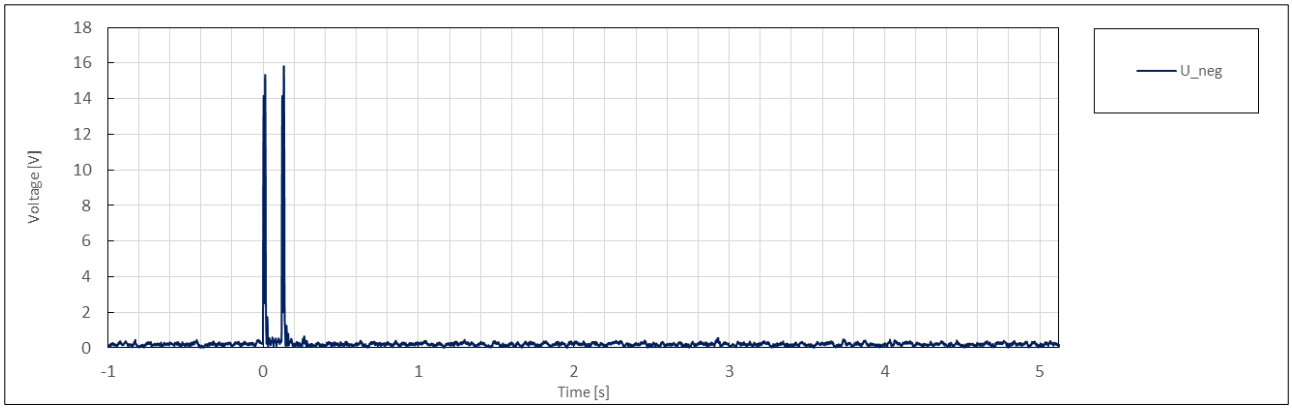


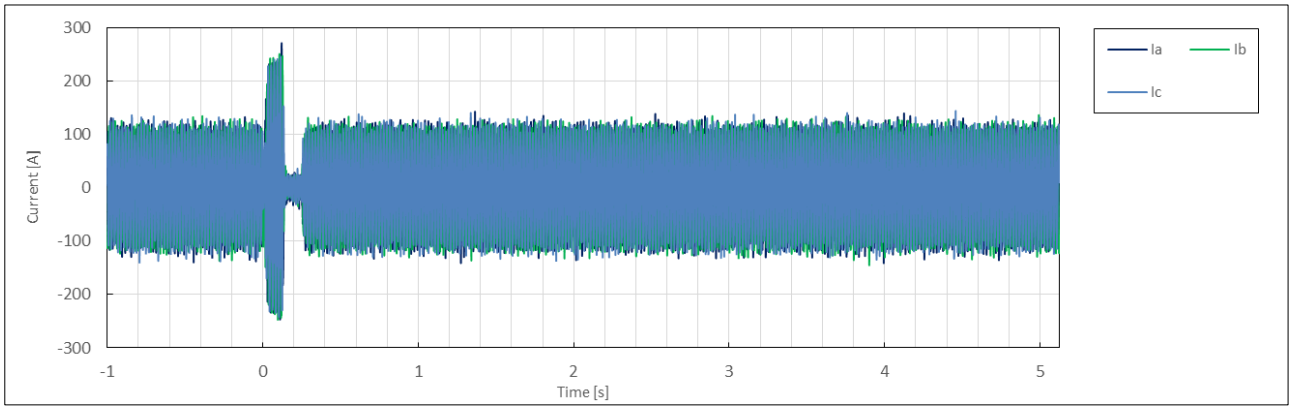
No. 8.2 Load Test

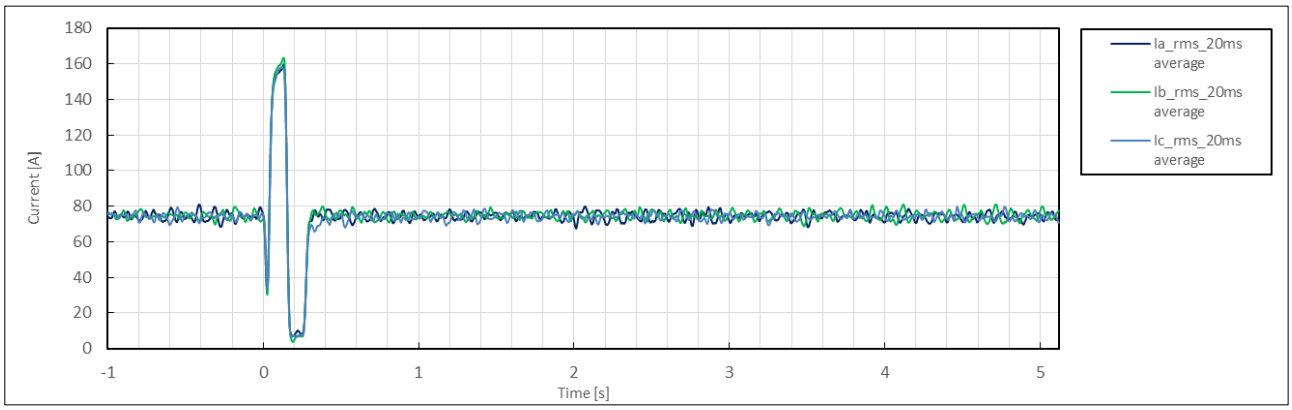


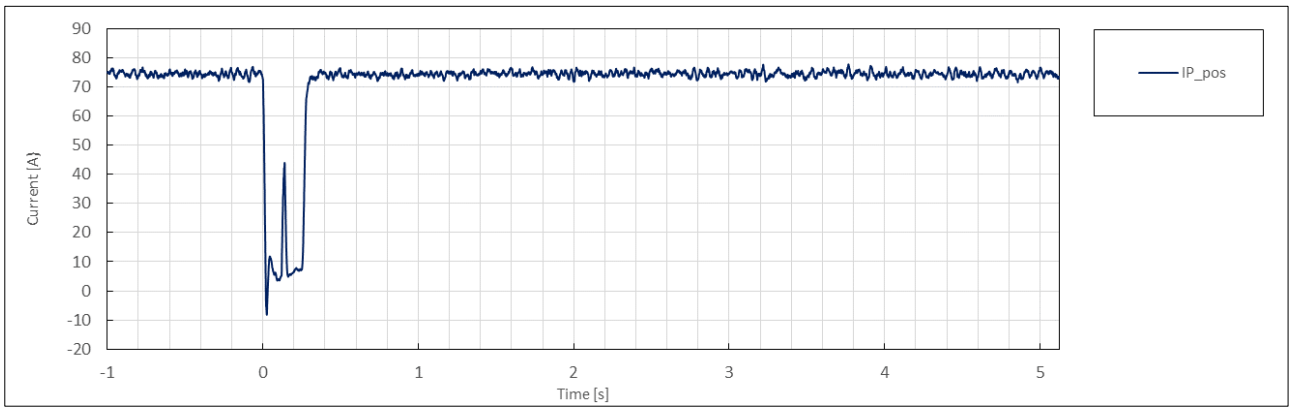


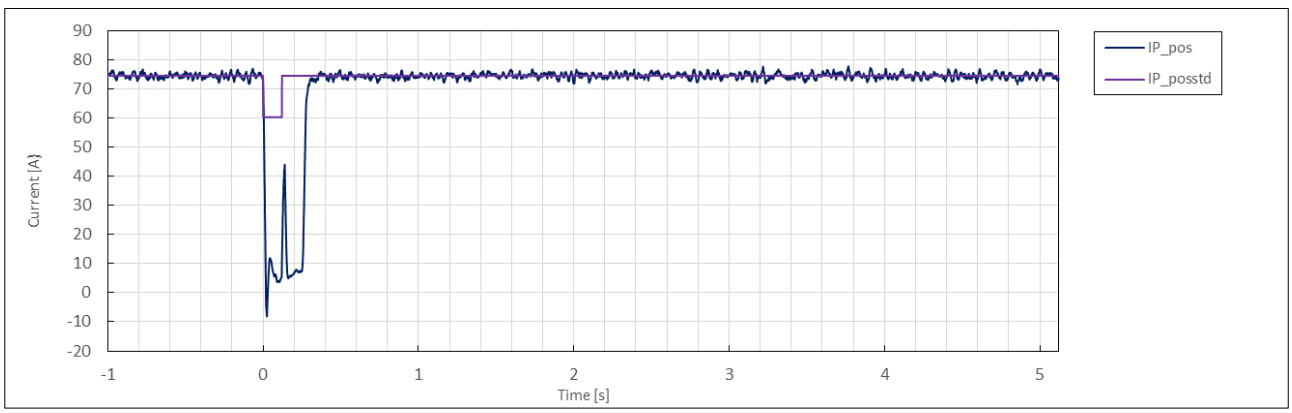


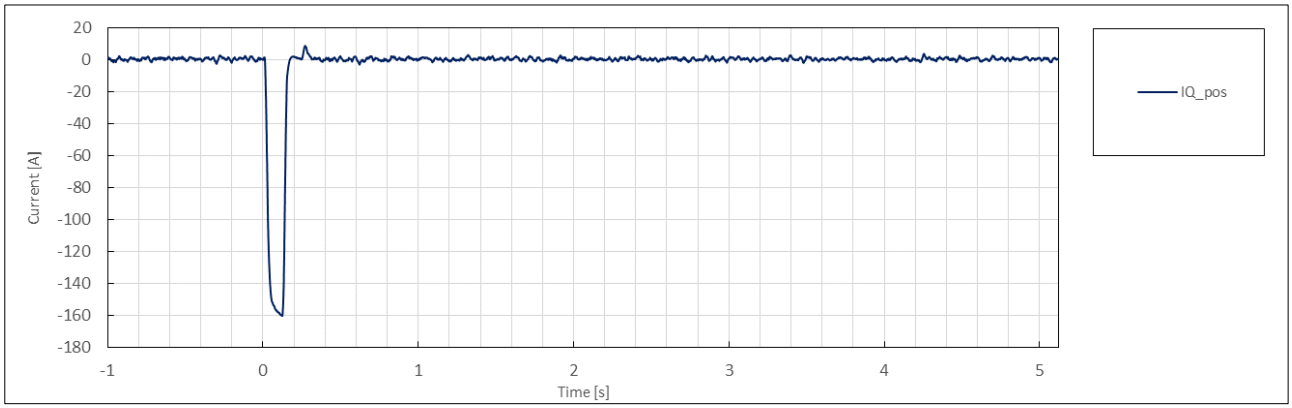


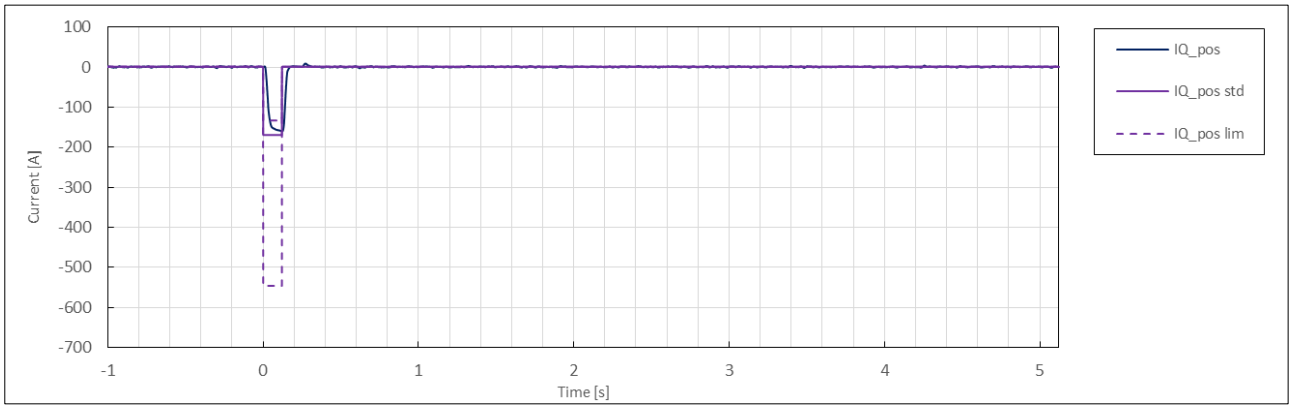

Current [A]
Time [s]
Ia
Ib
Ic

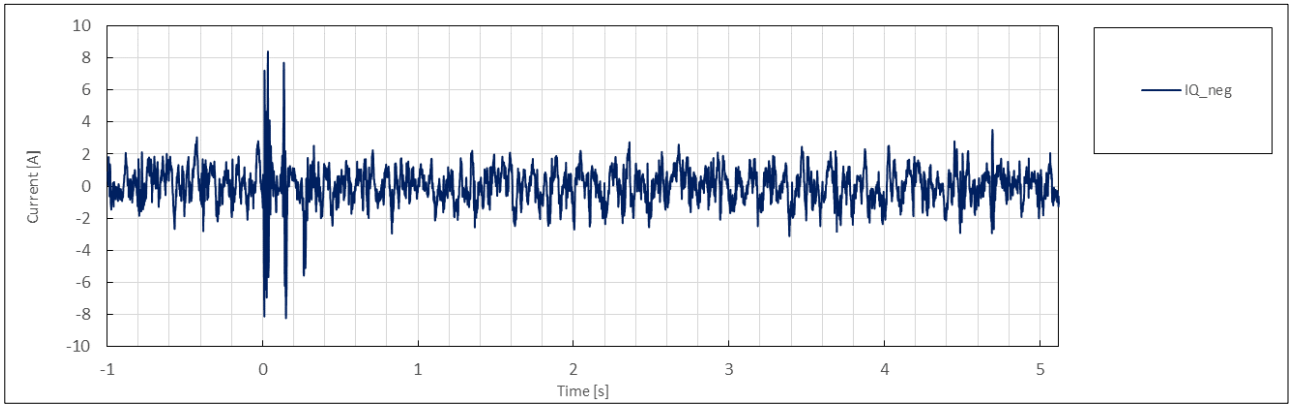

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

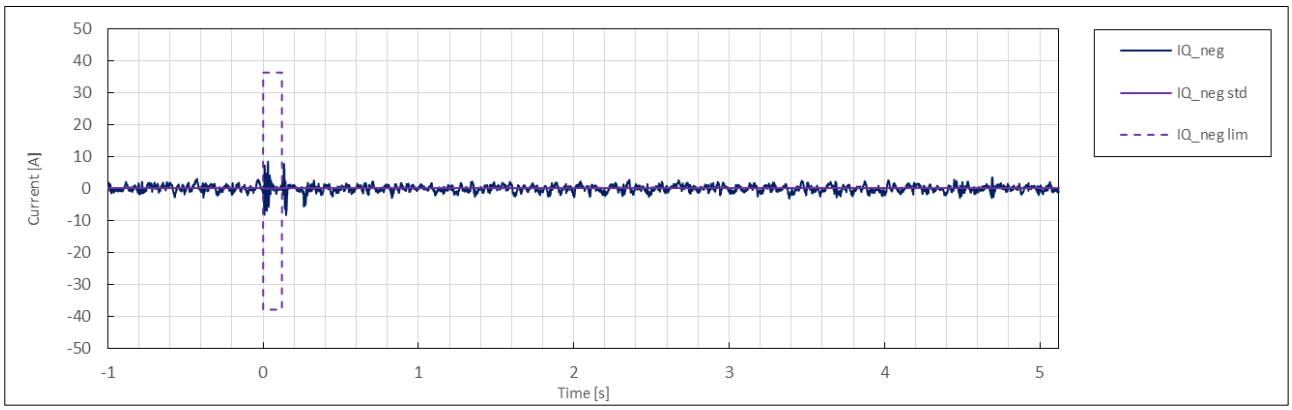

Current [A]
Time [s]
IP_pos

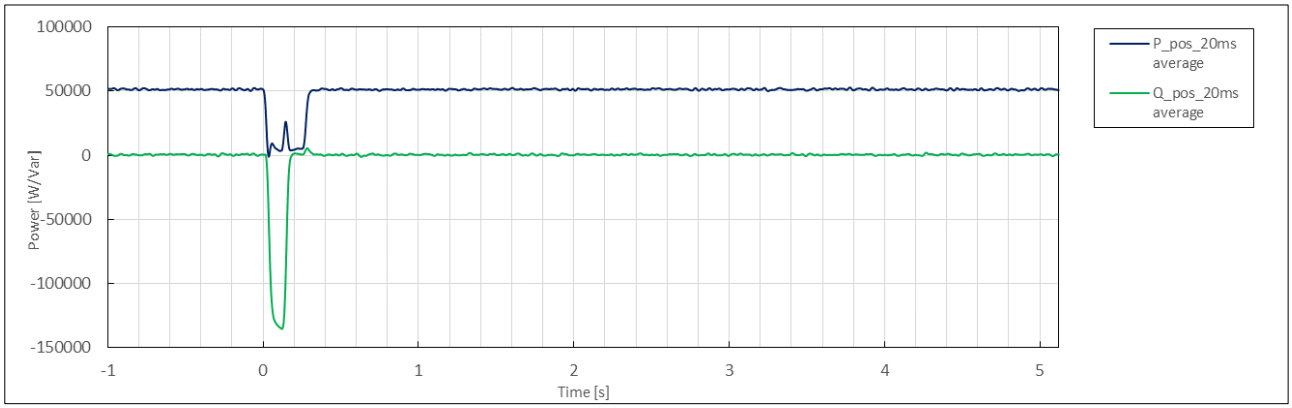

Current [A]
Time [s]
IP_pos
IP_posstd


20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos

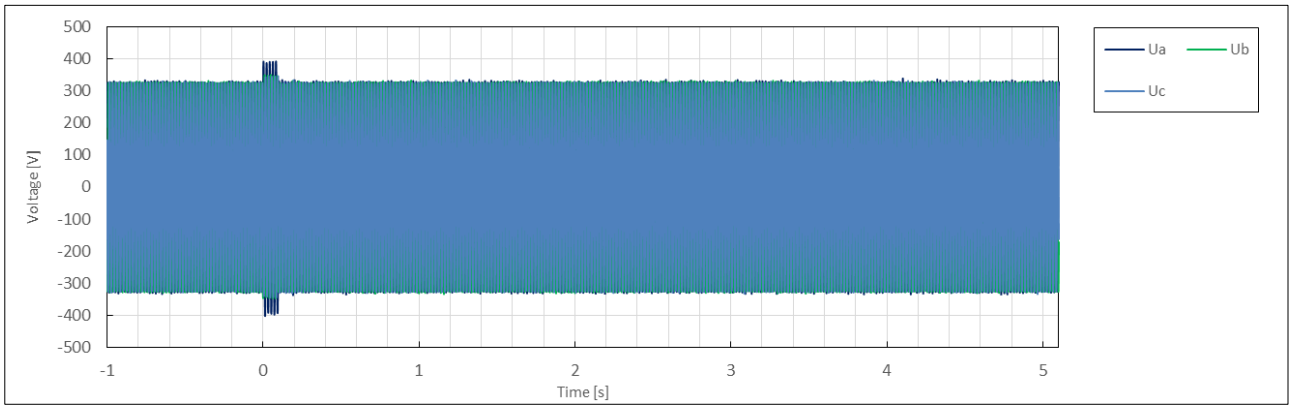

100
0
-100
-200
-300
-400
-500
-600
-700
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

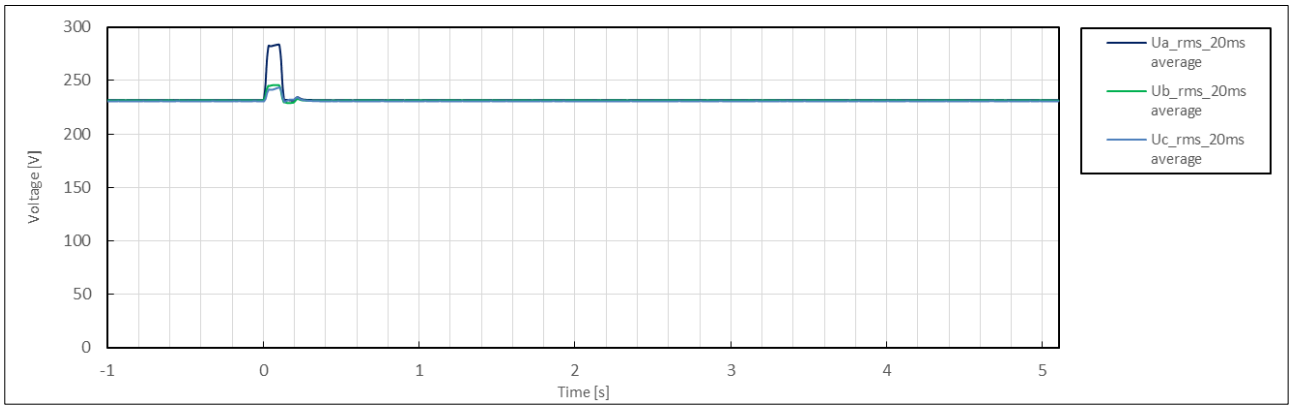

10
8
6
4
2
0
-2
-4
-6
-8
-10
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg

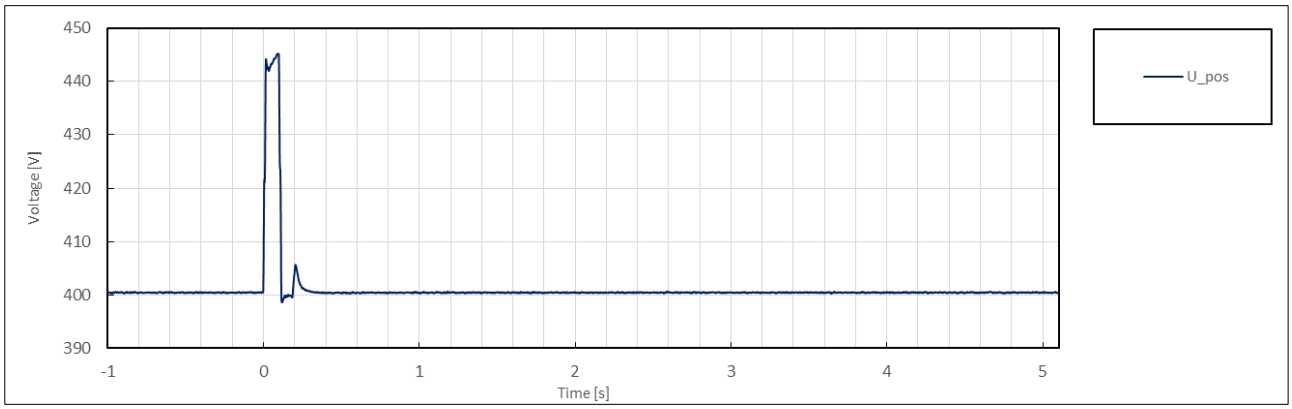

50
40
30
20
10
0
-10
-20
-30
-40
-50
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


100000
50000
0
-50000
-100000
-150000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

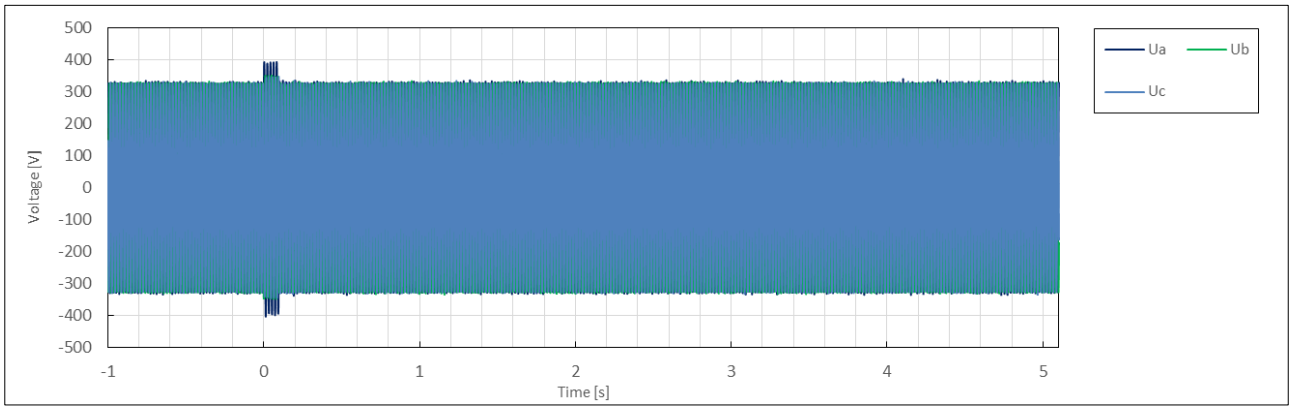
No. 8.3 Idle Test

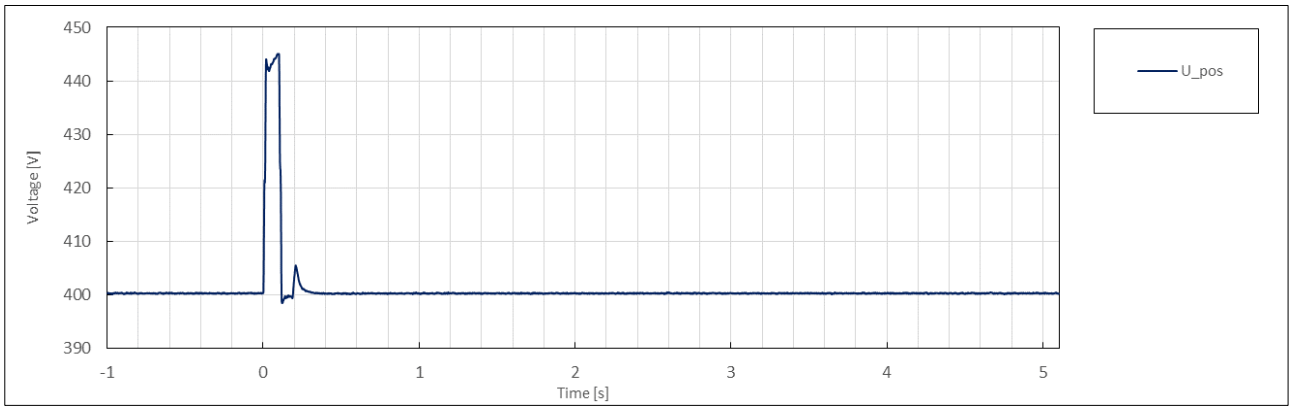


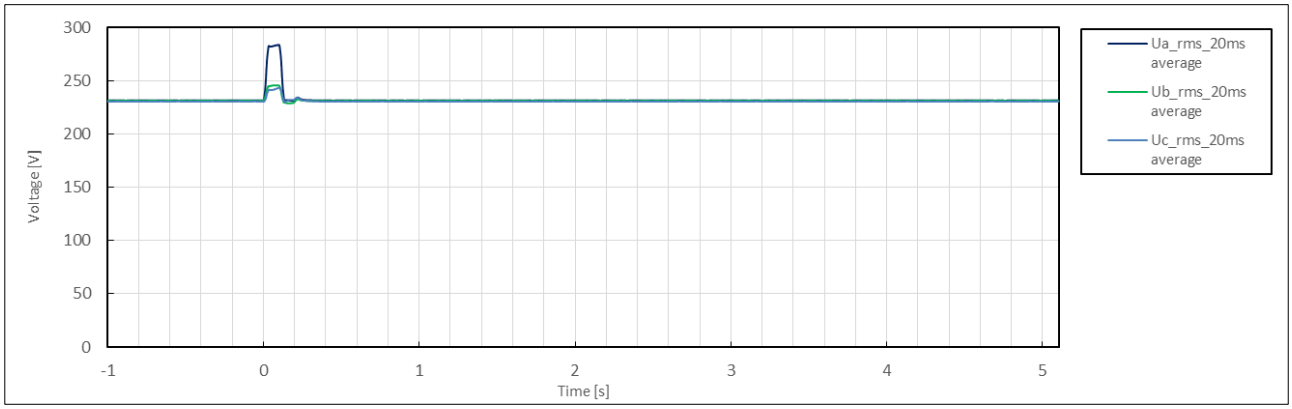


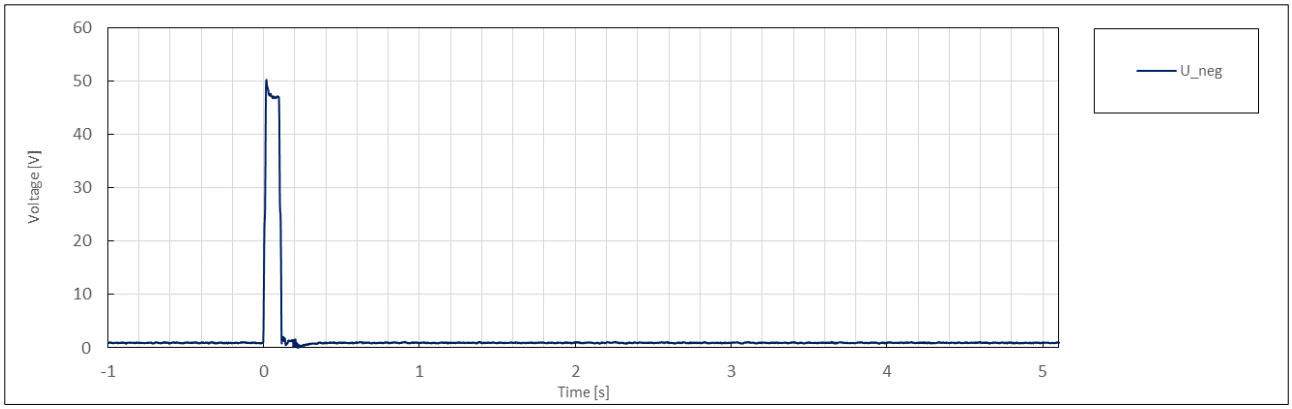


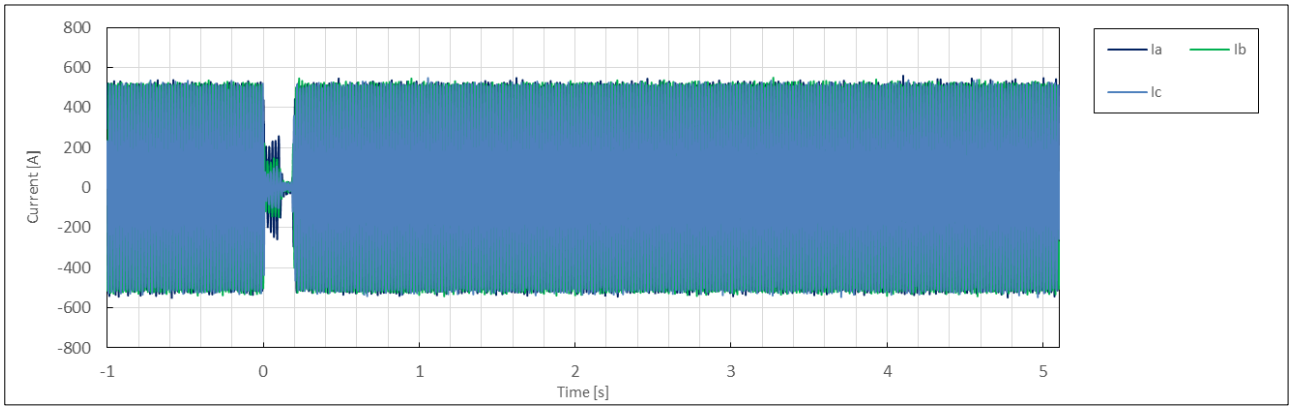
No. 8.3 Load Test

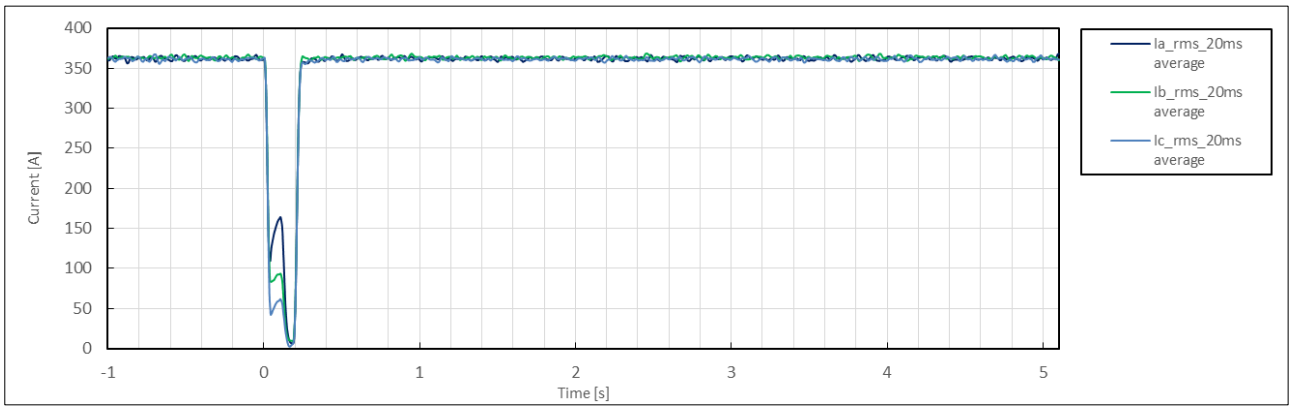


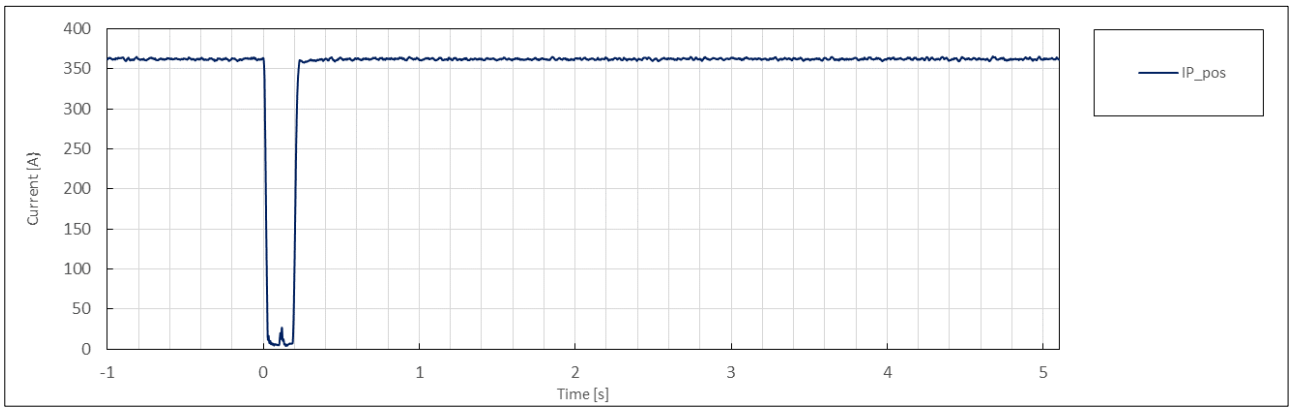


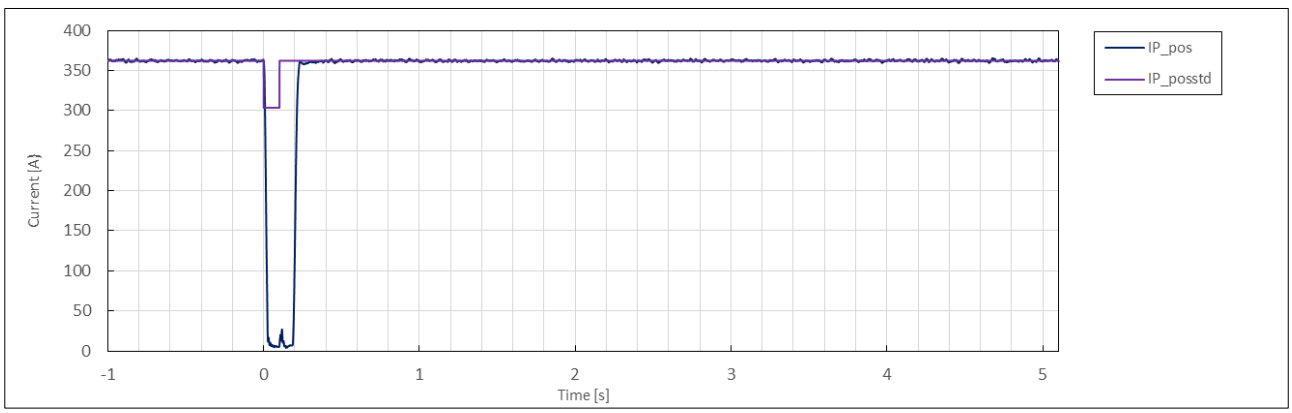


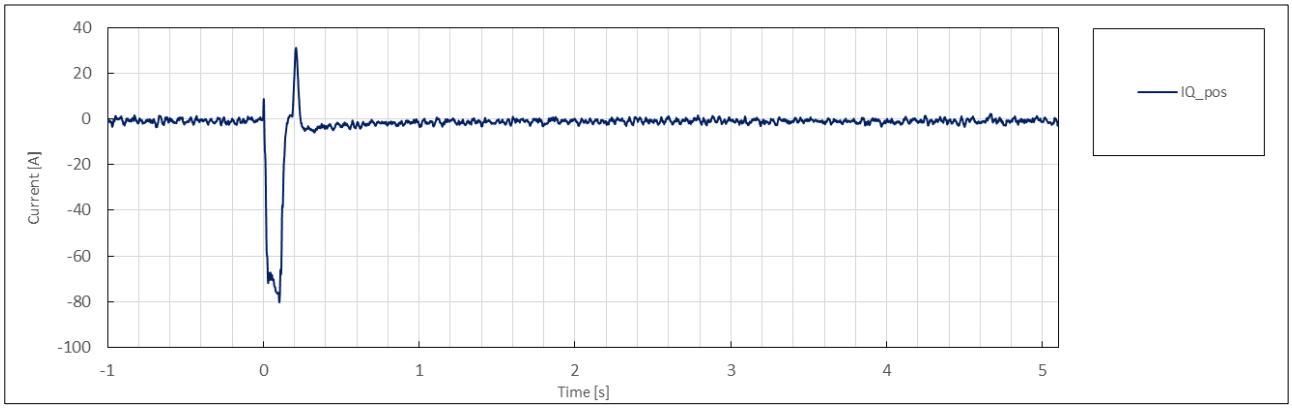


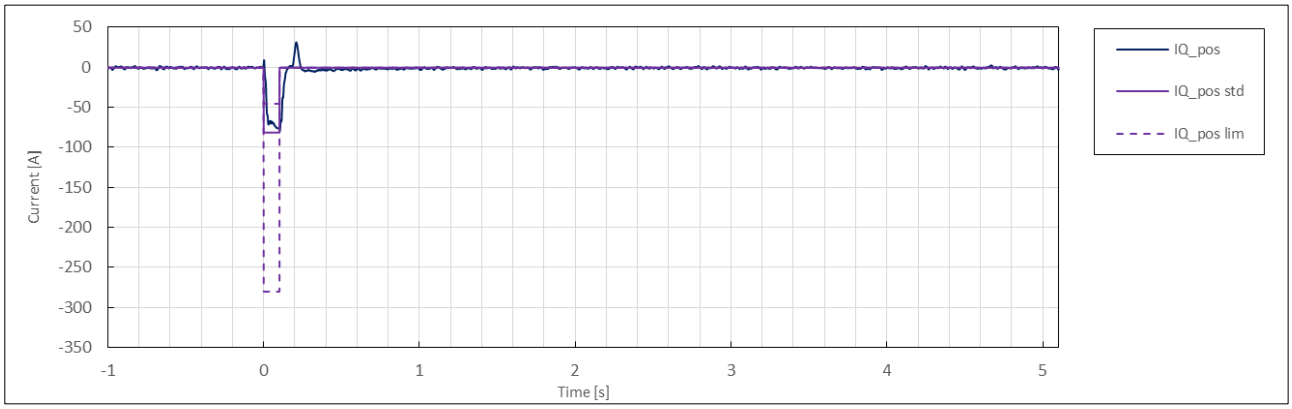

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
0
1
2
3
4
5
Time [s]
Ia
Ib
Ic

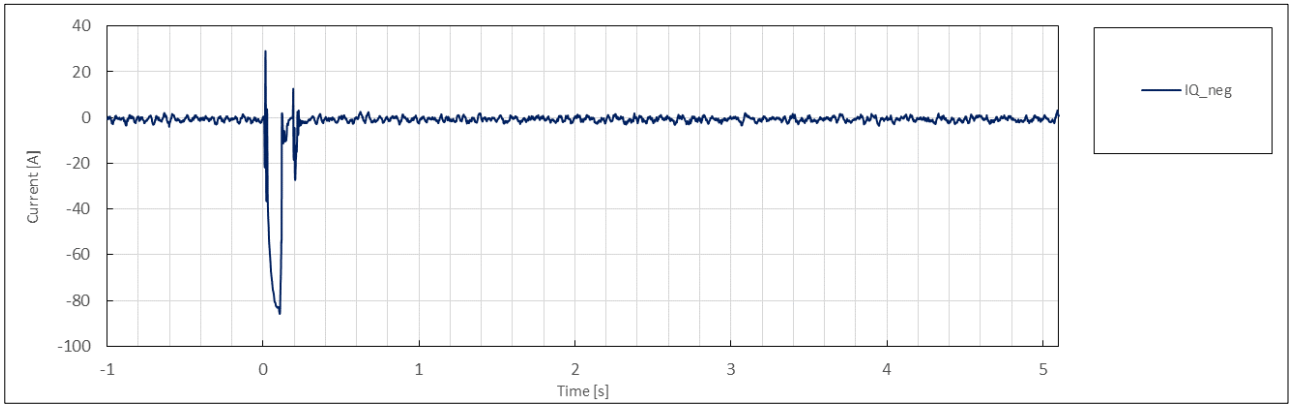

400
350
300
250
200
150
100
50
0
Current [A]
-1
0
1
2
3
4
5
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

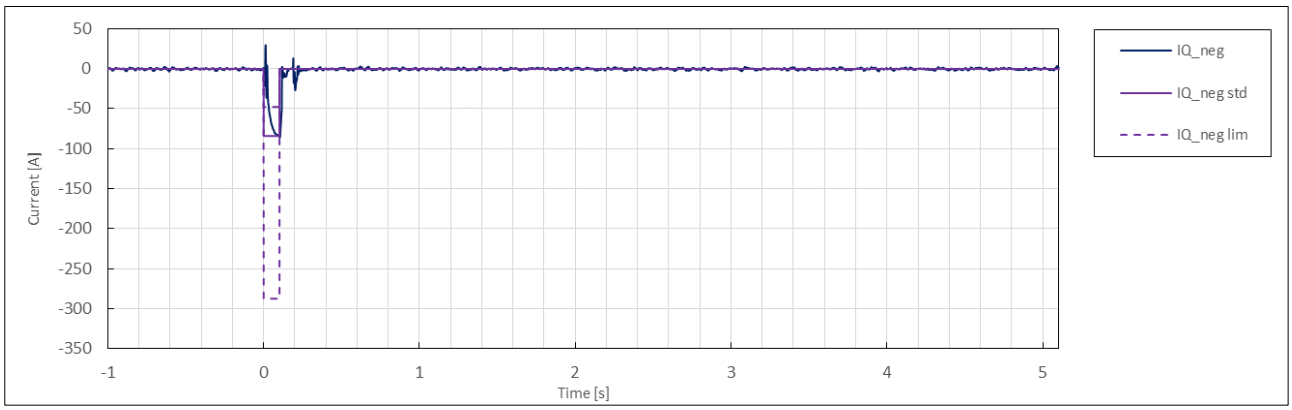

400
350
300
250
200
150
100
50
0
Current [A]
-1
0
1
2
3
4
5
Time [s]
IP_pos

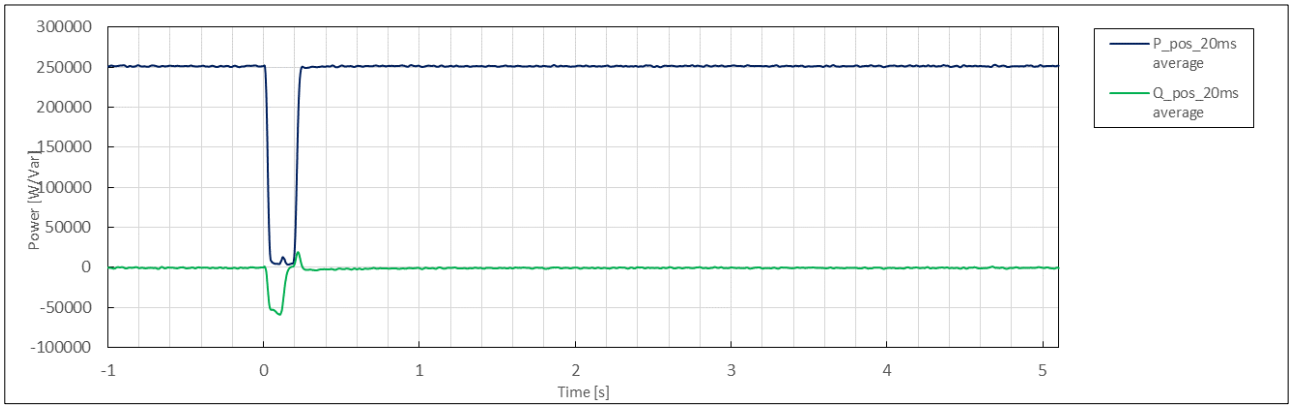

400
350
300
250
200
150
100
50
0
Current [A]
-1
0
1
2
3
4
5
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

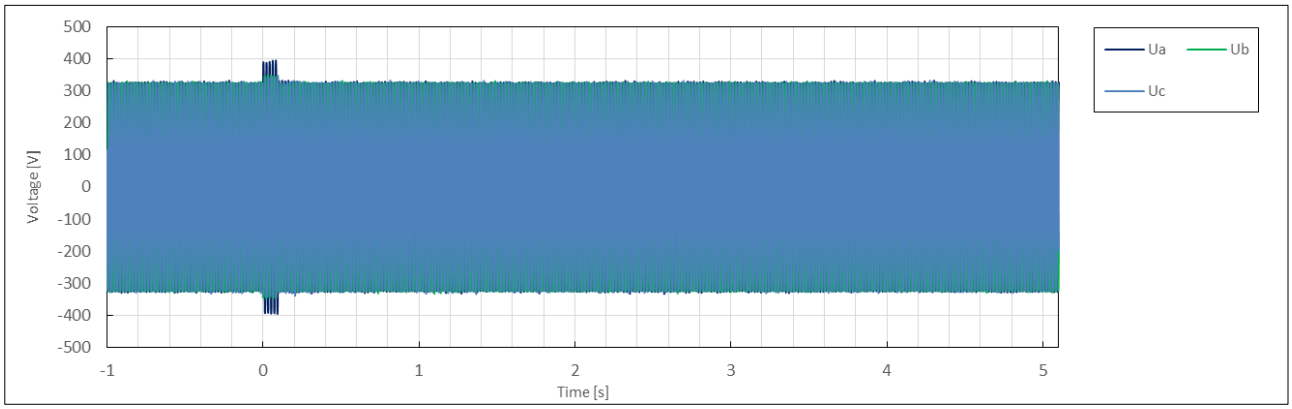

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

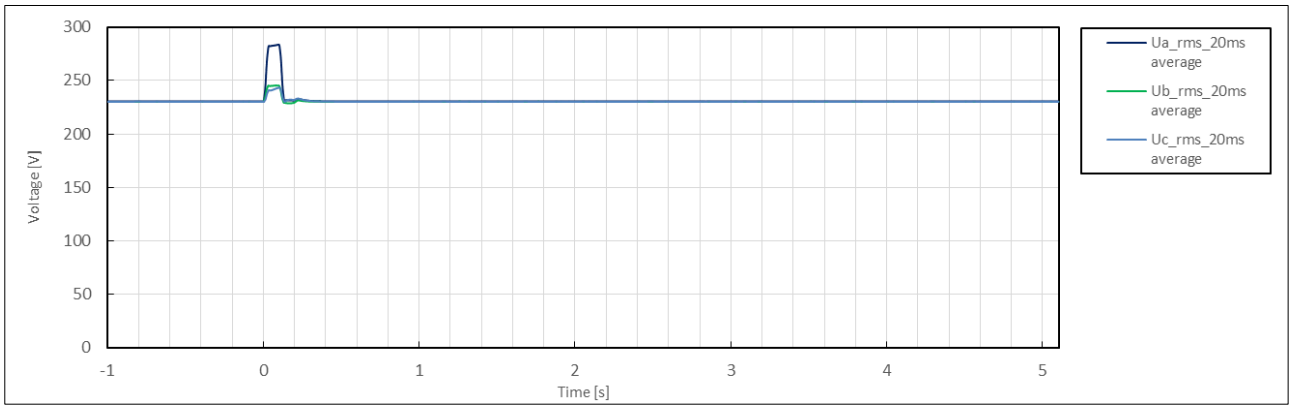

Current [A]
Time [s]
IQ_neg

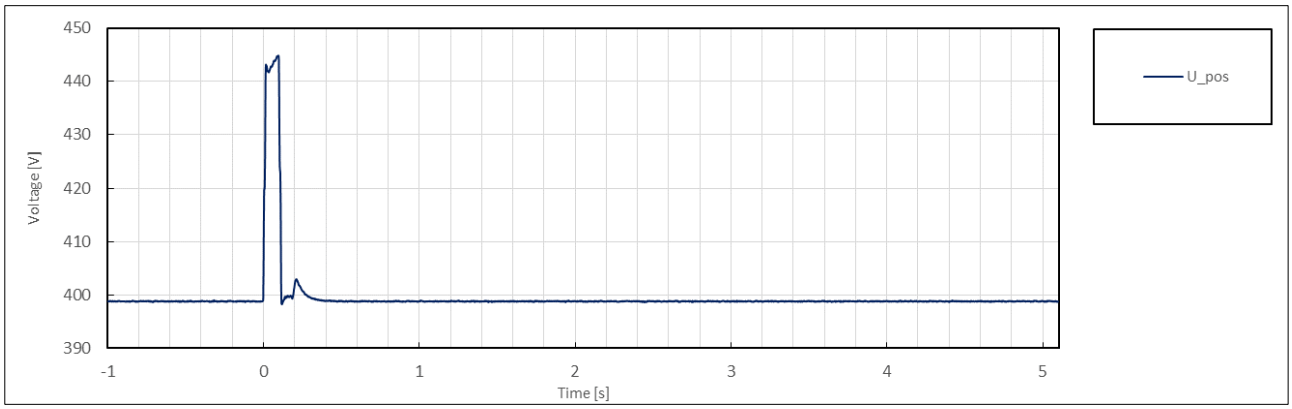

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

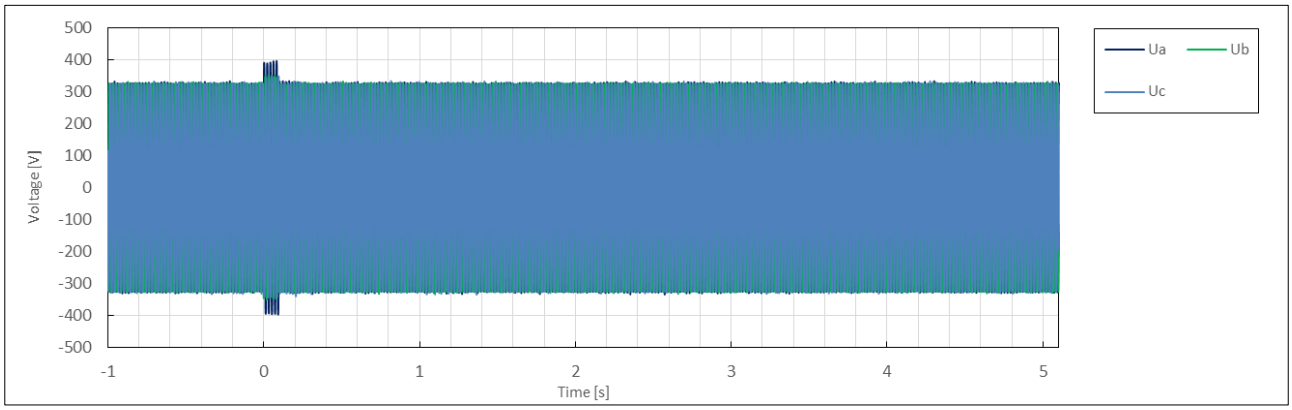
No. 8.4 Idle Test

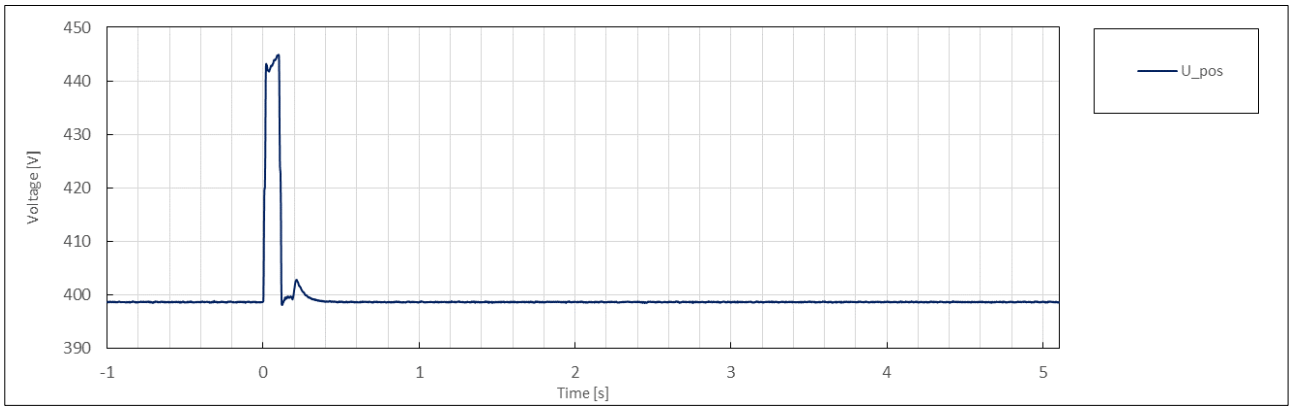


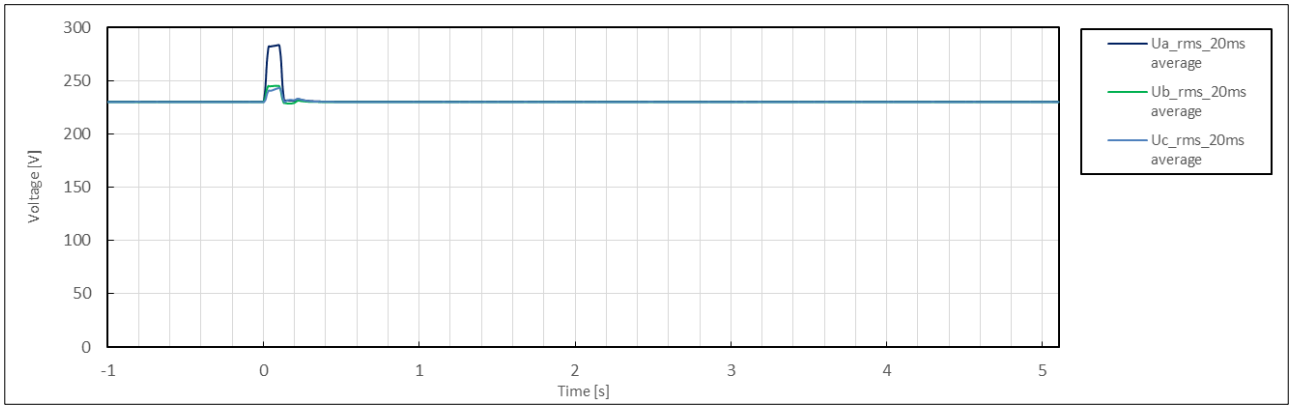


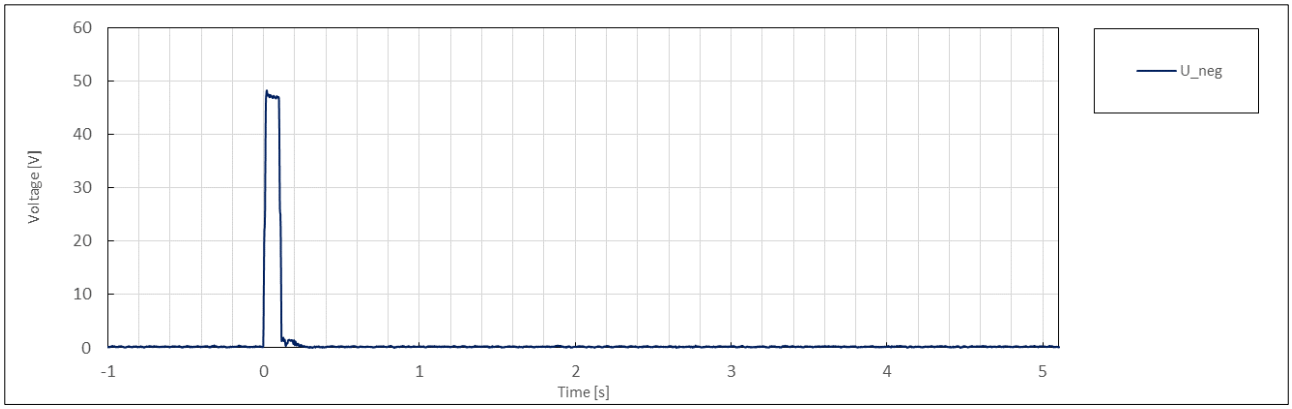


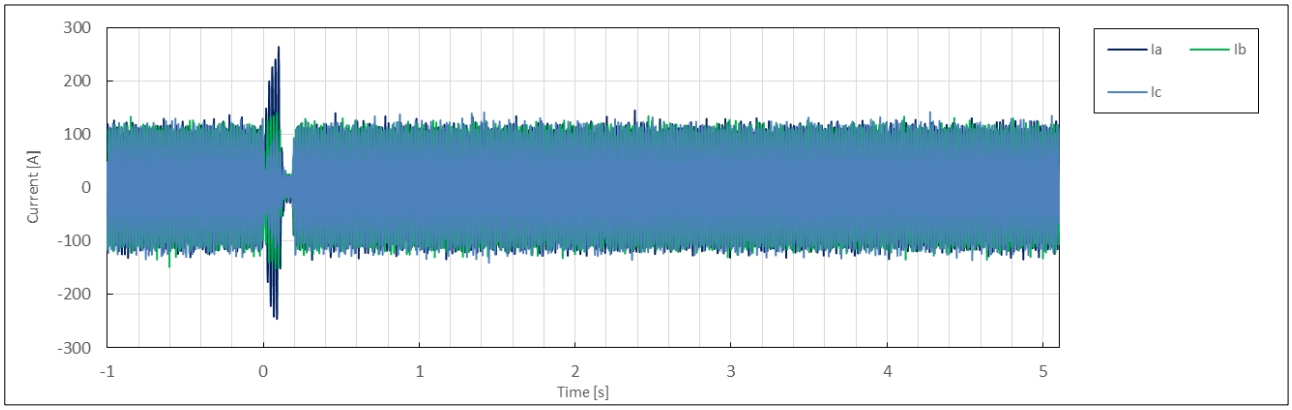
No. 8.4 Load Test

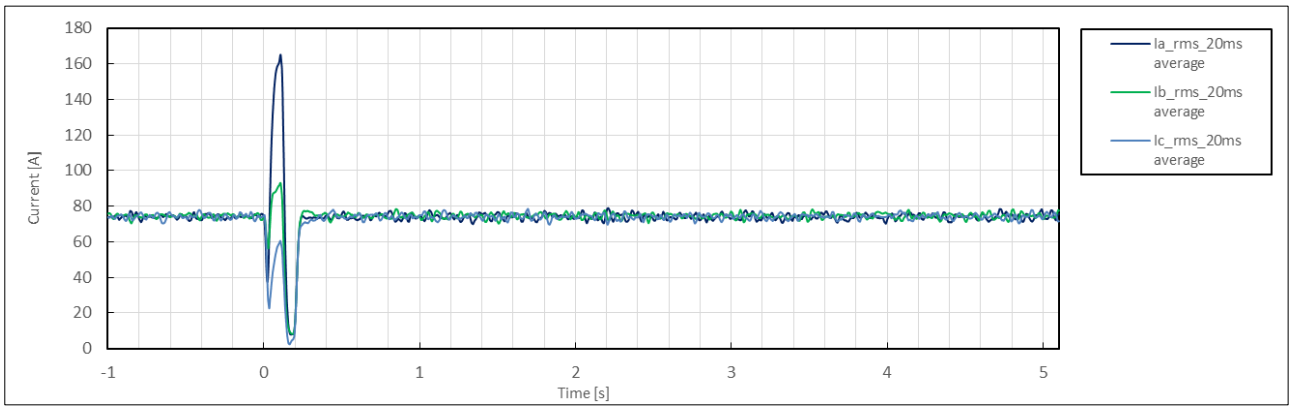


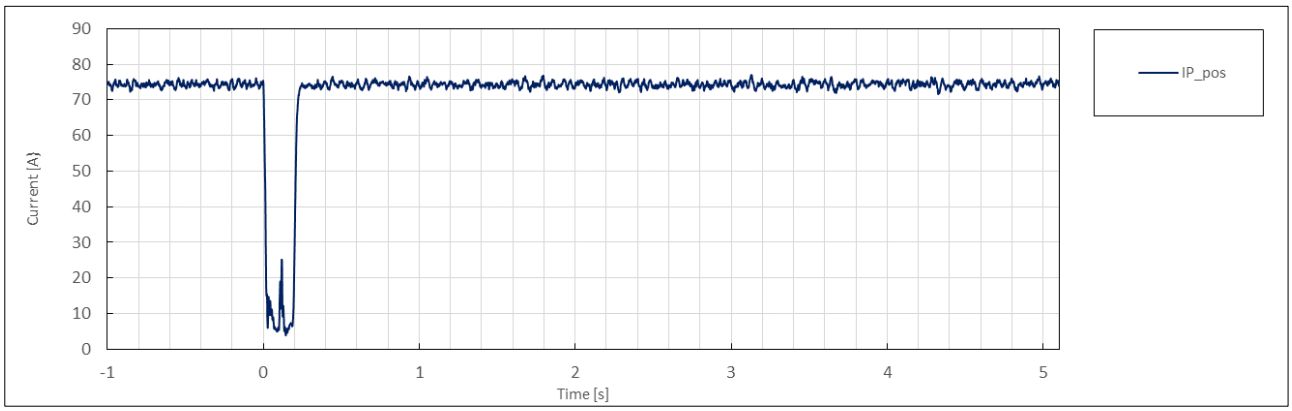


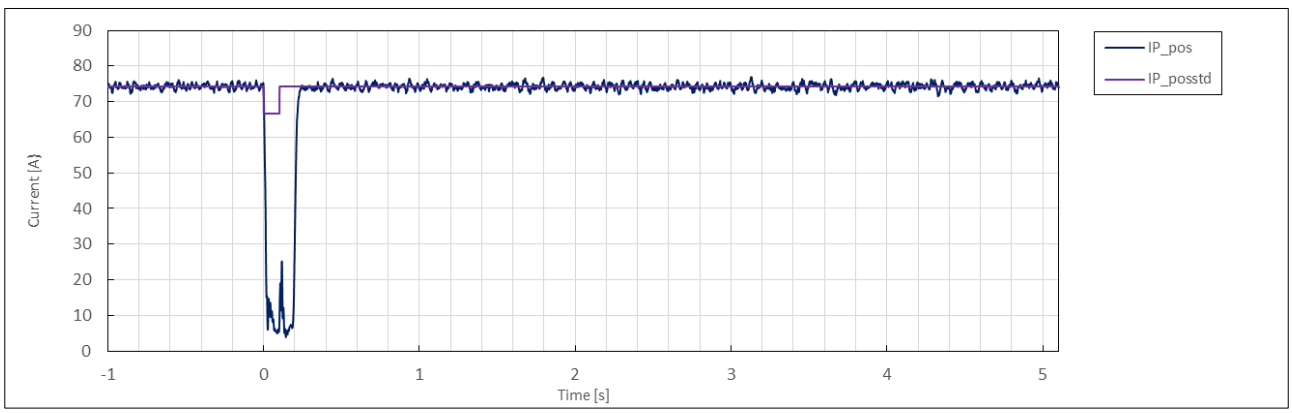


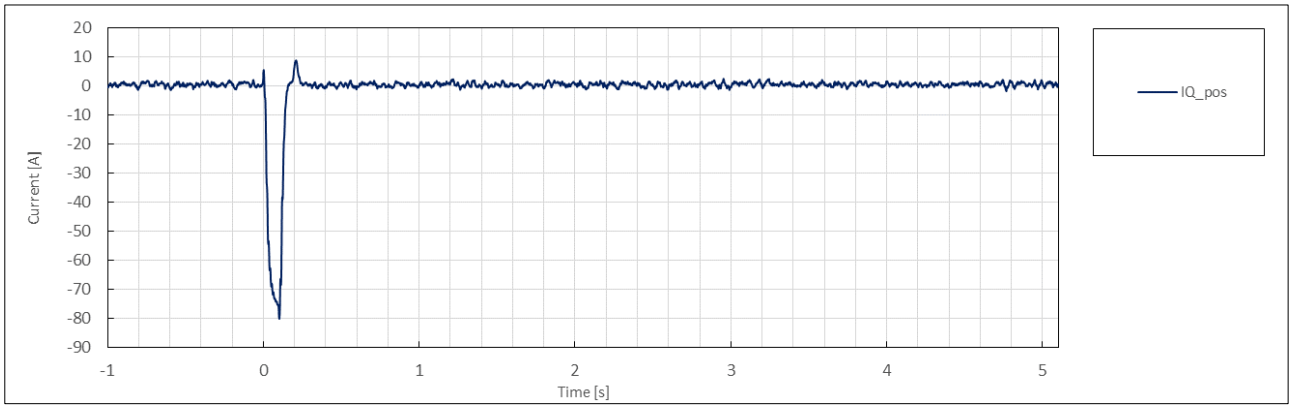


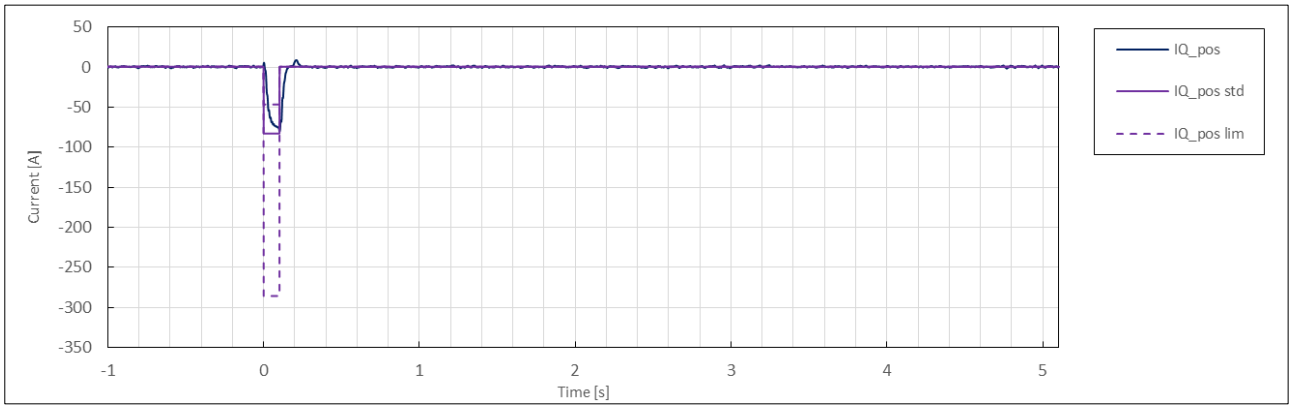

Current [A]
Time [s]
Ia
Ib
Ic

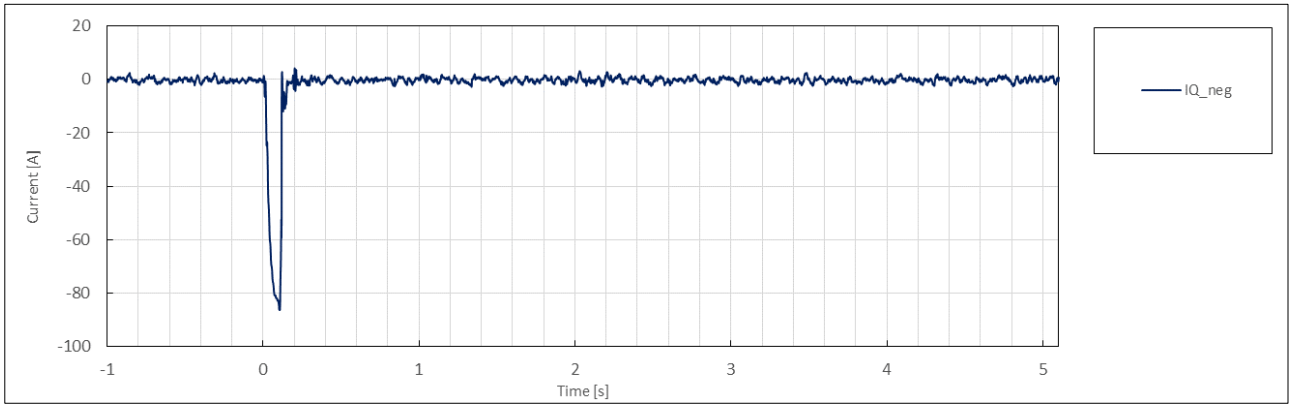

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

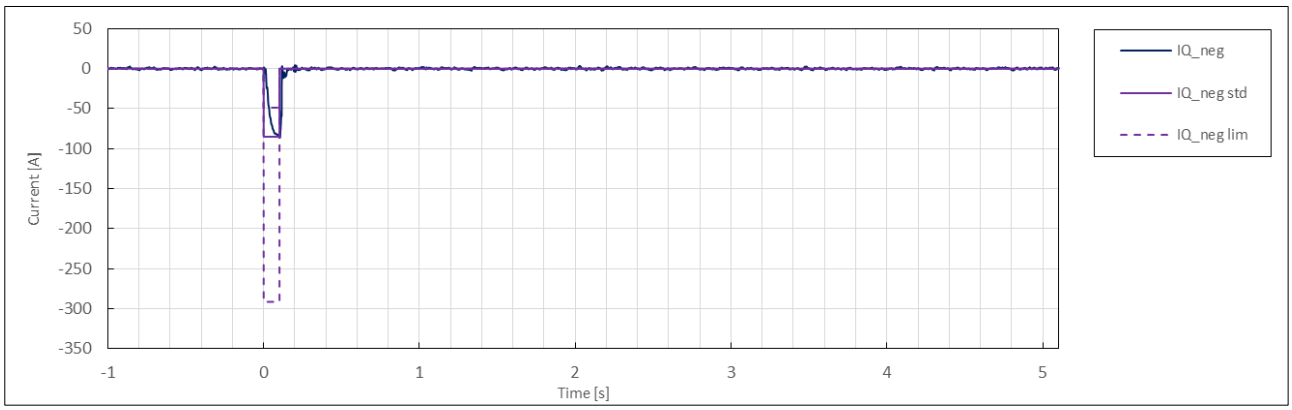

Current [A]
Time [s]
IP_pos

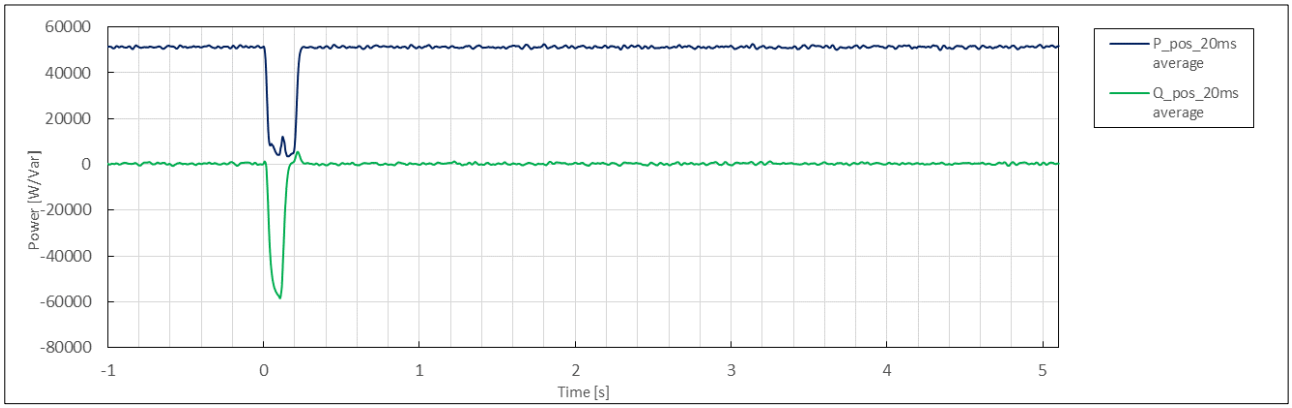

Current [A]
Time [s]
IP_pos
IP_posstd


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


60000
40000
20000
0
-20000
-40000
-60000
-80000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

DC Input: 885V

	No.	Parameter	Phase ref.	Time ref.	unit	1.1	1.2	1.3	1.4	2.1
General Info.	1	Test number	--	--	--	1.1	1.2	1.3	1.4	2.1
	2	Date	--	--	dd.mm.yyyy	4.3.2025	4.3.2025	28.3.2025	28.3.2025	4.3.2025
	3	Time	--	--	hh:mm:ss.f	4:11:45 PM	4:12:18 PM	5:24:49 PM	5:25:31 PM	4:39:58 PM
	4	Type of fault	--	--	--	3-phase fault	3-phase fault	2-phase fault	2-phase fault	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.02	0.02	0.03	0.03	
	6	Drop duration setpoint	--	--	ms	262	262	263	262	103
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	261	261	262	261	921
	14	Bridging series impedance (t3),	--	--	Ω	N/A	N/A	N/A	N/A	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	1.1	1.2	1.3	1.4	2.1
		if applicable								
	15	Fault duration determined from test	--	--	ms	261	261	262	261	921
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.03	0.03	0.03	0.03	0.22
	17		pos			0.04	0.04	0.53	0.53	0.22
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.00	1.00	1.00	1.00	1.00
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	1.00	1.00	1.00
	25		pos	t1-1s to t1	p.u.	1.00	1.00	1.00	1.00	1.00
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	1.00	0.21	1.00	0.21	1.00
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	1.00	0.21	1.00	0.21	1.00
	32	Active power	total	t1-10s to t1	p.u.	1.00	0.21	1.00	0.21	1.01

	No.	Parameter	Phase ref.	Time ref.	unit	1.1	1.2	1.3	1.4	2.1
	33		total	t1-2s to t1	p.u.	1.00	0.21	1.00	0.21	1.01
	34		pos	t1-500ms to t1-100ms	p.u.	1.00	0.21	1.00	0.21	1.00
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.02	1.05	1.01	1.02	1.23
	38		neg	--	--	N/A	N/A	1.03	1.03	N/A
	39	Reactive current settling up time	pos	--	ms	20	50	30	28	50
	40		neg	--	ms	N/A	N/A	23	28	N/A
	41	Reactive current settling time	pos	--	ms	48	50	30	28	50
	42		neg	--	ms	N/A	N/A	23	28	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.04	0.04	0.53	0.53	0.22
	44		neg	t1+100ms to t2-20ms	p.u.	0.00	0.00	0.48	0.48	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.99	1.01	0.48	0.49	0.97
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	0.00	-0.49	-0.49	0.00
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	1.06	1.07	0.49	0.49	0.97
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.00	0.49	0.49	0.00
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.01	0.01	0.27	0.28	0.00
	50		pos	t1+100ms to t2-20ms	p.u.	0.01	0.01	0.02	0.02	0.00

	No.	Parameter	Phase ref.	Time ref.	unit	1.1	1.2	1.3	1.4	2.1
	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	653.01	273.09	N/A	N/A	628.57
	52		phase2	t1 to t1+20ms	A	732.26	338.75	N/A	N/A	815.65
	53		phase3	t1 to t1+20ms	A	673.33	296.20	N/A	N/A	664.27
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	1.28	0.50	N/A	N/A	1.16
	55		phase 2	t1+20ms	p.u.	1.11	0.39	N/A	N/A	1.07
	56		phase 3	t1+20ms	p.u.	1.05	0.48	N/A	N/A	1.06
	57		phase 1	t1+100ms	p.u.	1.05	1.07	N/A	N/A	0.96
	58		phase 2	t1+100ms	p.u.	1.06	1.08	N/A	N/A	0.97
	59		phase 3	t1+100ms	p.u.	1.05	1.08	N/A	N/A	0.97
	60		phase 1	t1+150ms	p.u.	1.05	1.07	N/A	N/A	0.97
	61		phase 2	t1+150ms	p.u.	1.05	1.07	N/A	N/A	0.97
	62		phase 3	t1+150ms	p.u.	1.05	1.07	N/A	N/A	0.97
	63		phase 1	t1+300ms	p.u.	0.67	0.19	N/A	N/A	0.97
	64		phase 2	t1+300ms	p.u.	0.67	0.19	N/A	N/A	0.97
	65		phase 3	t1+300ms	p.u.	0.67	0.19	N/A	N/A	0.97
	66		phase 1	t1+500ms	p.u.	1.00	0.21	N/A	N/A	0.96
	67		phase 2	t1+500ms	p.u.	1.00	0.21	N/A	N/A	0.96
	68		phase 3	t1+500ms	p.u.	1.00	0.21	N/A	N/A	0.96
	69		phase 1	t1+1000ms	p.u.	0.98	0.21	N/A	N/A	1.02
	70		phase 2	t1+1000ms	p.u.	0.98	0.21	N/A	N/A	1.02
	71		phase 3	t1+1000ms	p.u.	0.98	0.21	N/A	N/A	1.02
Aft	72	Active power	total	t2+1s to	p.u.	1.00	0.21	1.00	0.21	1.01

	No.	Parameter	Phase ref.	Time ref.	unit	1.1	1.2	1.3	1.4	2.1
				t2+10s						
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.048	0.042	0.03	0.032	0.05

	No.	Parameter	Phase ref.	Time ref.	unit	2.2	2.3	2.4	2.5	2.6
General Info.	1	Test number	--	--	--	2.2	2.3	2.4	2.5	2.6
	2	Date	--	--	dd.mm.yyyy	4.3.2025	28.3.2025	28.3.2025	4.3.2025	4.3.2025
	3	Time	--	--	hh:mm:ss.f	4:40:37 PM	5:26:14 PM	5:26:58 PM	4:44:34 PM	4:45:15 PM
	4	Type of fault	--	--	--	3-phase fault	2-phase fault	2-phase fault	3-phase fault	2-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.		0.22	0.22		0.20
	6	Drop duration setpoint	--	--	ms	103	923	923	103	923
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	920	922	922	921	922
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	2.2	2.3	2.4	2.5	2.6
	15	Fault duration determined from test	--	--	ms	920	922	922	921	922
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.22	0.22	0.22	0.20	0.20
	17		pos			0.22	0.62	0.62	0.20	0.61
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.00	1.00	1.00	1.00	1.00
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	1.00	1.00	1.00
	25		pos	t1-1s to t1	p.u.	1.00	1.00	1.00	1.00	1.00
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.21	1.00	0.21	1.00	1.00
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	0.21	1.00	0.21	1.00	1.00
	32	Active power	total	t1-10s to t1	p.u.	0.21	1.00	0.21	1.00	1.00
	33		total	t1-2s to t1	p.u.	0.21	1.00	0.21	1.00	1.00

	No.	Parameter	Phase ref.	Time ref.	unit	2.2	2.3	2.4	2.5	2.6
	34		pos	t1-500ms to t1-100ms	p.u.	0.21	1.00	0.21	1.00	1.00
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.23	1.27	1.28	N/A	N/A
	38		neg	--	--	N/A	1.28	1.29	N/A	N/A
	39	Reactive current settling up time	pos	--	ms	45	30	29	N/A	N/A
	40		neg	--	ms	N/A	28	29	N/A	N/A
	41	Reactive current settling time	pos	--	ms	45	30	29	N/A	N/A
	42		neg	--	ms	N/A	28	29	N/A	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.22	0.62	0.62	0.20	0.61
	44		neg	t1+100ms to t2-20ms	p.u.	0.00	0.39	0.38	0.00	0.40
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.97	0.49	0.49	-0.03	-0.01
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	-0.49	-0.49	0.00	0.02
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.97	0.49	0.49	0.04	0.02
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.50	0.50	0.00	0.02
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.00	0.28	0.28	0.00	0.01
	50		pos	t1+100ms to t2-20ms	p.u.	0.00	0.01	0.01	0.00	0.01
	51	Short-circuit	phase1	t1 to	A	230.01	N/A	N/A	638.81	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	2.2	2.3	2.4	2.5	2.6
		currents, only for 3-phase fault		t1+20ms						
	52	Highes instantaneous values of current including any decaying DC current portion	phase2	t1 to t1+20ms	A	323.60	N/A	N/A	781.80	N/A
	53		phase3	t1 to t1+20ms	A	261.25	N/A	N/A	653.53	N/A
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.44	N/A	N/A	1.01	N/A
	55		phase 2	t1+20ms	p.u.	0.31	N/A	N/A	0.98	N/A
	56		phase 3	t1+20ms	p.u.	0.38	N/A	N/A	0.81	N/A
	57		phase 1	t1+100ms	p.u.	0.96	N/A	N/A	0.04	N/A
	58		phase 2	t1+100ms	p.u.	0.97	N/A	N/A	0.04	N/A
	59		phase 3	t1+100ms	p.u.	0.96	N/A	N/A	0.03	N/A
	60		phase 1	t1+150ms	p.u.	0.97	N/A	N/A	0.04	N/A
	61		phase 2	t1+150ms	p.u.	0.97	N/A	N/A	0.04	N/A
	62		phase 3	t1+150ms	p.u.	0.97	N/A	N/A	0.04	N/A
	63		phase 1	t1+300ms	p.u.	0.97	N/A	N/A	0.04	N/A
	64		phase 2	t1+300ms	p.u.	0.97	N/A	N/A	0.04	N/A
	65		phase 3	t1+300ms	p.u.	0.97	N/A	N/A	0.04	N/A
	66		phase 1	t1+500ms	p.u.	0.97	N/A	N/A	0.04	N/A
	67		phase 2	t1+500ms	p.u.	0.97	N/A	N/A	0.04	N/A
	68		phase 3	t1+500ms	p.u.	0.97	N/A	N/A	0.04	N/A
	69		phase 1	t1+1000ms	p.u.	0.21	N/A	N/A	1.00	N/A
	70		phase 2	t1+1000ms	p.u.	0.21	N/A	N/A	1.00	N/A
	71		phase 3	t1+1000ms	p.u.	0.21	N/A	N/A	1.00	N/A
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.21	1.00	0.21	1.00	1.00

	No.	Parameter	Phase ref.	Time ref.	unit	2.2	2.3	2.4	2.5	2.6
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.044	0.027	0.034	0.049	0.049

	No.	Parameter	Phase ref.	Time ref.	unit	3.1	3.2	3.3	3.4	4.1
General Info.	1	Test number	--	--	--	3.1	3.2	3.3	3.4	4.1
	2	Date	--	--	dd.mm.yyyy	4.3.2025	4.3.2025	28.3.2025	28.3.2025	4.3.2025
	3	Time	--	--	hh:mm:ss.f	4:45:55 PM	4:46:35 PM	5:32:09 PM	5:32:51 PM	4:48:38 PM
	4	Type of fault	--	--	--	3-phase fault	3-phase fault	2-phase fault	2-phase fault	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.50	0.50	0.52	0.52	0.75
	6	Drop duration setpoint	--	--	ms	1881	1881	1881	1883	2701
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	1881	1881	1880	1882	2701
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	3.1	3.2	3.3	3.4	4.1
	15	Fault duration determined from test	--	--	ms	1881	1881	1880	1882	2701
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.52	0.52	0.52	0.52	0.76
	17		pos			0.52	0.52	0.76	0.76	0.76
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.00	1.00	1.00	1.00	1.00
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	1.00	1.00	1.00
	25		pos	t1-1s to t1	p.u.	1.00	1.00	1.00	1.00	1.00
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	1.00	0.21	1.00	0.21	1.00
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	1.00	0.21	1.00	0.21	1.00
	32	Active power	total	t1-10s to t1	p.u.	1.01	0.21	1.00	0.21	1.00
	33		total	t1-2s to t1	p.u.	1.01	0.21	1.00	0.21	1.00

	No.	Parameter	Phase ref.	Time ref.	unit	3.1	3.2	3.3	3.4	4.1
	34		pos	t1-500ms to t1-100ms	p.u.	1.01	0.21	1.00	0.21	1.00
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.95	1.96	1.98	2.00	1.96
	38		neg	--	--	N/A	N/A	1.99	2.00	N/A
	39	Reactive current settling up time	pos	--	ms	48	44	37	39	51
	40		neg	--	ms	N/A	N/A	38	39	N/A
	41	Reactive current settling time	pos	--	ms	48	44	37	39	51
	42		neg	--	ms	N/A	N/A	38	39	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.52	0.52	0.76	0.76	0.76
	44		neg	t1+100ms to t2-20ms	p.u.	0.00	0.00	0.24	0.24	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.95	0.95	0.49	0.49	0.48
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	0.00	-0.48	-0.48	0.00
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.95	0.95	0.49	0.49	0.48
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.00	0.48	0.48	0.00
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.01	0.01	0.26	0.26	0.02
	50		pos	t1+100ms to t2-20ms	p.u.	0.01	0.01	0.01	0.02	0.02
	51	Short-circuit	phase1	t1 to	A	602.21	208.48	N/A	N/A	569.04

	No.	Parameter	Phase ref.	Time ref.	unit	3.1	3.2	3.3	3.4	4.1
		currents, only for 3-phase fault		t1+20ms						
	52	Highes instantaneous values of current including any decaying DC current portion	phase2	t1 to t1+20ms	A	702.99	234.21	N/A	N/A	602.27
	53		phase3	t1 to t1+20ms	A	582.09	218.11	N/A	N/A	552.90
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	1.09	0.35	N/A	N/A	1.04
	55		phase 2	t1+20ms	p.u.	1.00	0.26	N/A	N/A	0.99
	56		phase 3	t1+20ms	p.u.	0.98	0.30	N/A	N/A	0.97
	57		phase 1	t1+100ms	p.u.	0.95	0.94	N/A	N/A	0.49
	58		phase 2	t1+100ms	p.u.	0.95	0.95	N/A	N/A	0.48
	59		phase 3	t1+100ms	p.u.	0.95	0.95	N/A	N/A	0.49
	60		phase 1	t1+150ms	p.u.	0.95	0.94	N/A	N/A	0.48
	61		phase 2	t1+150ms	p.u.	0.95	0.94	N/A	N/A	0.48
	62		phase 3	t1+150ms	p.u.	0.95	0.94	N/A	N/A	0.48
	63		phase 1	t1+300ms	p.u.	0.94	0.95	N/A	N/A	0.47
	64		phase 2	t1+300ms	p.u.	0.94	0.95	N/A	N/A	0.47
	65		phase 3	t1+300ms	p.u.	0.94	0.95	N/A	N/A	0.47
	66		phase 1	t1+500ms	p.u.	0.95	0.94	N/A	N/A	0.49
	67		phase 2	t1+500ms	p.u.	0.95	0.94	N/A	N/A	0.49
	68		phase 3	t1+500ms	p.u.	0.95	0.94	N/A	N/A	0.49
	69		phase 1	t1+1000ms	p.u.	0.94	0.94	N/A	N/A	0.49
	70		phase 2	t1+1000ms	p.u.	0.94	0.94	N/A	N/A	0.49
	71		phase 3	t1+1000ms	p.u.	0.94	0.94	N/A	N/A	0.49
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	1.01	0.21	1.00	0.21	1.01

	No.	Parameter	Phase ref.	Time ref.	unit	3.1	3.2	3.3	3.4	4.1
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.05	0.043	0.027	0.029	0.05

	No.	Parameter	Phase ref.	Time ref.	unit	4.2	4.3	4.4	4.5	4.6
General Info.	1	Test number	--	--	--	4.2	4.3	4.4	4.5	4.6
	2	Date	--	--	dd.mm.yyyy	4.3.2025	28.3.2025	28.3.2025	4.3.2025	17.3.2025
	3	Time	--	--	hh:mm:ss.f	4:49:10 PM	5:33:34 PM	5:34:16 PM	4:51:03 PM	2:36:16 PM
	4	Type of fault	--	--	--	3-phase fault	2-phase fault	2-phase fault	3-phase fault	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.75	0.76	0.76	0.75	0.76
	6	Drop duration setpoint	--	--	ms	2701	2702	2701	2701	2702
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	2701	2701	2700	2701	2701
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	4.2	4.3	4.4	4.5	4.6
	15	Fault duration determined from test	--	--	ms	2701	2701	2700	2701	2701
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.76	0.76	0.76	0.75	0.76
	17		pos			0.76	0.88	0.88	0.75	0.77
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.00	1.00	1.00	1.00	1.01
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	1.00	1.00	1.01
	25		pos	t1-1s to t1	p.u.	1.00	1.00	1.00	1.00	1.01
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.20	1.00	0.21	0.37	0.37
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	-0.31	0.31
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	-0.31	0.31
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	0.21	1.00	0.21	0.20	0.21
	32	Active power	total	t1-10s to t1	p.u.	0.21	1.00	0.21	0.20	0.21
	33		total	t1-2s to t1	p.u.	0.21	1.00	0.21	0.20	0.21

	No.	Parameter	Phase ref.	Time ref.	unit	4.2	4.3	4.4	4.5	4.6
	34		pos	t1-500ms to t1-100ms	p.u.	0.21	1.00	0.21	0.20	0.21
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.98	2.02	2.05	1.60	2.33
	38		neg	--	--	N/A	1.98	2.00	N/A	N/A
	39	Reactive current settling up time	pos	--	ms	44	38	37	37	64
	40		neg	--	ms	N/A	39	38	N/A	N/A
	41	Reactive current settling time	pos	--	ms	44	38	37	37	64
	42		neg	--	ms	N/A	39	38	N/A	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.76	0.88	0.88	0.75	0.77
	44		neg	t1+100ms to t2-20ms	p.u.	0.00	0.12	0.12	0.00	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.48	0.26	0.26	0.08	0.87
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	-0.24	-0.24	0.00	0.00
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.48	0.26	0.26	0.08	0.87
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.24	0.24	0.00	0.00
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.02	0.14	0.14	0.01	0.02
	50		pos	t1+100ms to t2-20ms	p.u.	0.02	0.02	0.02	0.01	0.02
	51	Short-circuit	phase1	t1 to	A	181.95	N/A	N/A	242.00	305.97

	No.	Parameter	Phase ref.	Time ref.	unit	4.2	4.3	4.4	4.5	4.6
		currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion		t1+20ms						
	52		phase2	t1 to t1+20ms	A	204.94	N/A	N/A	196.60	269.98
	53		phase3	t1 to t1+20ms	A	160.24	N/A	N/A	204.84	258.40
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.27	N/A	N/A	0.28	0.38
	55		phase 2	t1+20ms	p.u.	0.23	N/A	N/A	0.24	0.40
	56		phase 3	t1+20ms	p.u.	0.25	N/A	N/A	0.29	0.33
	57		phase 1	t1+100ms	p.u.	0.49	N/A	N/A	0.12	0.85
	58		phase 2	t1+100ms	p.u.	0.48	N/A	N/A	0.11	0.84
	59		phase 3	t1+100ms	p.u.	0.49	N/A	N/A	0.11	0.85
	60		phase 1	t1+150ms	p.u.	0.48	N/A	N/A	0.10	0.86
	61		phase 2	t1+150ms	p.u.	0.48	N/A	N/A	0.10	0.86
	62		phase 3	t1+150ms	p.u.	0.48	N/A	N/A	0.10	0.86
	63		phase 1	t1+300ms	p.u.	0.48	N/A	N/A	0.08	0.88
	64		phase 2	t1+300ms	p.u.	0.48	N/A	N/A	0.08	0.88
	65		phase 3	t1+300ms	p.u.	0.48	N/A	N/A	0.08	0.88
	66		phase 1	t1+500ms	p.u.	0.48	N/A	N/A	0.08	0.87
	67		phase 2	t1+500ms	p.u.	0.48	N/A	N/A	0.08	0.87
	68		phase 3	t1+500ms	p.u.	0.48	N/A	N/A	0.08	0.87
	69		phase 1	t1+1000ms	p.u.	0.48	N/A	N/A	0.08	0.87
	70		phase 2	t1+1000ms	p.u.	0.48	N/A	N/A	0.08	0.87
	71		phase 3	t1+1000ms	p.u.	0.48	N/A	N/A	0.08	0.87
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.21	1.00	0.21	0.20	0.21

	No.	Parameter	Phase ref.	Time ref.	unit	4.2	4.3	4.4	4.5	4.6
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.046	0.024	0.025	0.561	0.045

	No.	Parameter	Phase ref.	Time ref.	unit	4.7	4.8	4.9	4.10	5.1
General Info.	1	Test number	--	--	--	4.7	4.8	4.9	4.10	5.1
	2	Date	--	--	dd.mm.yyyy	4.3.2025	17.3.2025	4.3.2025	4.3.2025	4.3.2025
	3	Time	--	--	hh:mm:ss.f	4:54:08 PM	2:36:49 PM	4:55:39 PM	5:41:11 PM	4:57:12 PM
	4	Type of fault	--	--	--	3-phase fault	2-phase fault	3-phase fault	2-phase fault	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.75	0.77	0.75	0.75	0.88
	6	Drop duration setpoint	--	--	ms	2701	2702	2701	3022	60021
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	2701	2701	2681	3021	60020
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	4.7	4.8	4.9	4.10	5.1
	15	Fault duration determined from test	--	--	ms	2701	2701	2681	3021	60020
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.77	0.77	0.75	0.75	0.88
	17		pos			0.77	0.88	0.75	0.87	0.88
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.00	1.00	1.00	1.00	1.01
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	1.00	1.00	1.01
	25		pos	t1-1s to t1	p.u.	1.00	1.00	1.00	1.00	1.01
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.21	0.21	1.00	1.00	1.00
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	0.20	0.21	1.00	1.00	1.00
	32	Active power	total	t1-10s to t1	p.u.	0.20	0.21	1.00	1.00	1.01
	33		total	t1-2s to t1	p.u.	0.20	0.21	1.00	1.00	1.01

	No.	Parameter	Phase ref.	Time ref.	unit	4.7	4.8	4.9	4.10	5.1
	34		pos	t1-500ms to t1-100ms	p.u.	0.21	0.21	1.00	1.00	1.01
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	4.30	4.08	N/A	N/A	2.00
	38		neg	--	--	N/A	3.90	N/A	N/A	N/A
	39	Reactive current settling up time	pos	--	ms	45	40	N/A	N/A	52
	40		neg	--	ms	N/A	59	N/A	N/A	N/A
	41	Reactive current settling time	pos	--	ms	45	40	N/A	N/A	52
	42		neg	--	ms	N/A	59	N/A	N/A	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.77	0.88	0.75	0.87	0.88
	44		neg	t1+100ms to t2-20ms	p.u.	0.00	0.11	0.00	0.13	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	1.00	0.49	-0.01	0.00	0.24
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	-0.44	0.00	0.01	0.00
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	1.00	0.49	0.02	0.02	0.24
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.44	0.00	0.01	0.00
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.02	0.25	0.01	0.02	0.02
	50		pos	t1+100ms to t2-20ms	p.u.	0.02	0.02	0.01	0.02	0.02
	51	Short-circuit	phase1	t1 to	A	159.93	N/A	559.83	N/A	538.53

	No.	Parameter	Phase ref.	Time ref.	unit	4.7	4.8	4.9	4.10	5.1
		currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion		t1+20ms						
	52		phase2	t1 to t1+20ms	A	196.65	N/A	596.33	N/A	566.89
	53		phase3	t1 to t1+20ms	A	161.46	N/A	555.94	N/A	546.87
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.28	N/A	0.91	N/A	0.93
	55		phase 2	t1+20ms	p.u.	0.22	N/A	0.86	N/A	0.84
	56		phase 3	t1+20ms	p.u.	0.25	N/A	0.70	N/A	0.71
	57		phase 1	t1+100ms	p.u.	1.00	N/A	0.01	N/A	0.25
	58		phase 2	t1+100ms	p.u.	1.00	N/A	0.02	N/A	0.24
	59		phase 3	t1+100ms	p.u.	0.99	N/A	0.01	N/A	0.25
	60		phase 1	t1+150ms	p.u.	1.00	N/A	0.02	N/A	0.24
	61		phase 2	t1+150ms	p.u.	1.00	N/A	0.02	N/A	0.24
	62		phase 3	t1+150ms	p.u.	1.00	N/A	0.02	N/A	0.24
	63		phase 1	t1+300ms	p.u.	1.00	N/A	0.02	N/A	0.24
	64		phase 2	t1+300ms	p.u.	1.00	N/A	0.02	N/A	0.24
	65		phase 3	t1+300ms	p.u.	1.00	N/A	0.02	N/A	0.24
	66		phase 1	t1+500ms	p.u.	1.00	N/A	0.02	N/A	0.24
	67		phase 2	t1+500ms	p.u.	1.00	N/A	0.02	N/A	0.24
	68		phase 3	t1+500ms	p.u.	1.00	N/A	0.02	N/A	0.24
	69		phase 1	t1+1000ms	p.u.	1.00	N/A	0.02	N/A	0.24
	70		phase 2	t1+1000ms	p.u.	1.00	N/A	0.02	N/A	0.24
	71		phase 3	t1+1000ms	p.u.	1.00	N/A	0.02	N/A	0.24
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.20	0.21	1.00	1.00	1.01

	No.	Parameter	Phase ref.	Time ref.	unit	4.7	4.8	4.9	4.10	5.1
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.041	0.041	0.045	0.043	0.044

	No.	Parameter	Phase ref.	Time ref.	unit	5.2	5.3	5.4	5.5	6.1
General Info.	1	Test number	--	--	--	5.2	5.3	5.4	5.5	6.1
	2	Date	--	--	dd.mm.yyyy	4.3.2025	28.3.2025	28.3.2025	4.3.2025	4.3.2025
	3	Time	--	--	hh:mm:ss.f	4:58:18 PM	5:34:58 PM	5:35:48 PM	5:00:42 PM	5:02:18 PM
	4	Type of fault	--	--	--	3-phase fault	2-phase fault	2-phase fault	3-phase fault	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.	0.88	0.88	0.88	0.88	
	6	Drop duration setpoint	--	--	ms	60021	60021	60022	60021	103
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	60020	60020	60021	60020	60021
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	5.2	5.3	5.4	5.5	6.1
	15	Fault duration determined from test	--	--	ms	60020	60020	60021	60020	60021
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	0.88	0.88	0.88	0.89	1.15
	17		pos			0.88	0.95	0.95	0.89	1.15
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.00	1.00	1.00	1.00	1.00
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	1.00	1.00	1.00
	25		pos	t1-1s to t1	p.u.	1.00	1.00	1.00	1.00	1.00
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.21	1.00	0.21	0.20	1.00
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	0.21	1.00	0.21	0.20	1.00
	32	Active power	total	t1-10s to t1	p.u.	0.21	1.00	0.21	0.21	1.01
	33		total	t1-2s to t1	p.u.	0.21	1.00	0.21	0.21	1.01

	No.	Parameter	Phase ref.	Time ref.	unit	5.2	5.3	5.4	5.5	6.1
	34		pos	t1-500ms to t1-100ms	p.u.	0.21	1.00	0.21	0.20	1.01
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	2.03	2.12	2.21	5.14	1.88
	38		neg	--	--	N/A	1.98	2.00	N/A	N/A
	39	Reactive current settling up time	pos	--	ms	47	38	36	41	60
	40		neg	--	ms	N/A	10	45	N/A	N/A
	41	Reactive current settling time	pos	--	ms	47	38	36	41	60
	42		neg	--	ms	N/A	17	45	N/A	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	0.88	0.95	0.95	0.89	1.15
	44		neg	t1+100ms to t2-20ms	p.u.	0.00	0.06	0.06	0.00	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.24	0.12	0.12	0.57	-0.27
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	-0.12	-0.12	0.00	0.00
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.24	0.12	0.12	0.57	0.27
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.12	0.12	0.00	0.00
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.02	0.08	0.08	0.02	0.02
	50		pos	t1+100ms to t2-20ms	p.u.	0.02	0.02	0.02	0.02	0.02
	51	Short-circuit	phase1	t1 to	A	146.77	N/A	N/A	177.79	508.55

	No.	Parameter	Phase ref.	Time ref.	unit	5.2	5.3	5.4	5.5	6.1
		currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion		t1+20ms						
	52		phase2	t1 to t1+20ms	A	158.94	N/A	N/A	148.79	489.03
	53		phase3	t1 to t1+20ms	A	132.47	N/A	N/A	158.48	354.64
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.21	N/A	N/A	0.24	0.44
	55		phase 2	t1+20ms	p.u.	0.20	N/A	N/A	0.19	0.36
	56		phase 3	t1+20ms	p.u.	0.17	N/A	N/A	0.18	0.26
	57		phase 1	t1+100ms	p.u.	0.25	N/A	N/A	0.58	0.25
	58		phase 2	t1+100ms	p.u.	0.24	N/A	N/A	0.58	0.26
	59		phase 3	t1+100ms	p.u.	0.25	N/A	N/A	0.58	0.26
	60		phase 1	t1+150ms	p.u.	0.25	N/A	N/A	0.57	0.26
	61		phase 2	t1+150ms	p.u.	0.25	N/A	N/A	0.57	0.26
	62		phase 3	t1+150ms	p.u.	0.25	N/A	N/A	0.57	0.26
	63		phase 1	t1+300ms	p.u.	0.24	N/A	N/A	0.57	0.26
	64		phase 2	t1+300ms	p.u.	0.24	N/A	N/A	0.57	0.26
	65		phase 3	t1+300ms	p.u.	0.24	N/A	N/A	0.57	0.26
	66		phase 1	t1+500ms	p.u.	0.24	N/A	N/A	0.57	0.27
	67		phase 2	t1+500ms	p.u.	0.24	N/A	N/A	0.57	0.27
	68		phase 3	t1+500ms	p.u.	0.24	N/A	N/A	0.57	0.27
	69		phase 1	t1+1000ms	p.u.	0.24	N/A	N/A	0.57	0.27
	70		phase 2	t1+1000ms	p.u.	0.24	N/A	N/A	0.57	0.27
	71		phase 3	t1+1000ms	p.u.	0.24	N/A	N/A	0.57	0.27
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.21	1.00	0.21	0.20	1.01

	No.	Parameter	Phase ref.	Time ref.	unit	5.2	5.3	5.4	5.5	6.1
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.045	0.025	0.022	0.043	0.158

	No.	Parameter	Phase ref.	Time ref.	unit	6.2	6.3	6.4	6.5	7.1
General Info.	1	Test number	--	--	--	6.2	6.3	6.4	6.5	7.1
	2	Date	--	--	dd.mm.yyyy	4.3.2025	28.3.2025	28.3.2025	17.3.2025	4.3.2025
	3	Time	--	--	hh:mm:ss.f	5:03:03 PM	5:36:32 PM	5:37:56 PM	2:41:48 PM	5:06:31 PM
	4	Type of fault	--	--	--	3-phase fault	2-phase fault	2-phase fault	3-phase fault	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.		1.15	1.15	1.15	
	6	Drop duration setpoint	--	--	ms	103	60002	60002	60002	103
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	60020	60001	60001	60001	5021
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	6.2	6.3	6.4	6.5	7.1
	15	Fault duration determined from test	--	--	ms	60020	60001	60001	60001	5021
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	1.15	1.15	1.15	1.15	1.19
	17		pos			1.15	1.07	1.07	1.15	1.19
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.00	1.00	1.00	1.01	1.01
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	1.00	1.01	1.01
	25		pos	t1-1s to t1	p.u.	1.00	1.00	1.00	1.01	1.01
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.21	1.00	0.20	0.37	1.00
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	0.31	0.00
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	0.31	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	0.21	1.00	0.20	0.20	1.00
	32	Active power	total	t1-10s to t1	p.u.	0.21	1.00	0.20	0.21	1.01
	33		total	t1-2s to t1	p.u.	0.21	1.00	0.20	0.21	1.01

	No.	Parameter	Phase ref.	Time ref.	unit	6.2	6.3	6.4	6.5	7.1
	34		pos	t1-500ms to t1-100ms	p.u.	0.21	1.00	0.20	0.21	1.01
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.86	2.39	2.32	2.23	1.90
	38		neg	--	--	N/A	2.04	2.05	N/A	N/A
	39	Reactive current settling up time	pos	--	ms	61	21	91	68	53
	40		neg	--	ms	N/A	31	37	N/A	N/A
	41	Reactive current settling time	pos	--	ms	61	21	91	68	53
	42		neg	--	ms	N/A	31	37	N/A	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	1.15	1.07	1.07	1.15	1.19
	44		neg	t1+100ms to t2-20ms	p.u.	0.00	0.07	0.07	0.00	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	-0.27	-0.17	-0.17	-0.01	-0.36
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	-0.15	-0.15	0.00	0.00
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.27	0.17	0.17	0.02	0.36
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.15	0.15	0.00	0.00
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.02	0.09	0.09	0.02	0.02
	50		pos	t1+100ms to t2-20ms	p.u.	0.02	0.02	0.02	0.02	0.02
	51	Short-circuit	phase1	t1 to	A	92.85	N/A	N/A	154.97	455.69

	No.	Parameter	Phase ref.	Time ref.	unit	6.2	6.3	6.4	6.5	7.1
		currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion		t1+20ms						
	52		phase2	t1 to t1+20ms	A	108.73	N/A	N/A	186.71	443.44
	53		phase3	t1 to t1+20ms	A	77.83	N/A	N/A	189.80	317.65
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.07	N/A	N/A	0.20	0.39
	55		phase 2	t1+20ms	p.u.	0.05	N/A	N/A	0.25	0.30
	56		phase 3	t1+20ms	p.u.	0.04	N/A	N/A	0.25	0.16
	57		phase 1	t1+100ms	p.u.	0.25	N/A	N/A	0.03	0.34
	58		phase 2	t1+100ms	p.u.	0.26	N/A	N/A	0.02	0.36
	59		phase 3	t1+100ms	p.u.	0.25	N/A	N/A	0.02	0.34
	60		phase 1	t1+150ms	p.u.	0.26	N/A	N/A	0.02	0.36
	61		phase 2	t1+150ms	p.u.	0.26	N/A	N/A	0.02	0.36
	62		phase 3	t1+150ms	p.u.	0.26	N/A	N/A	0.02	0.36
	63		phase 1	t1+300ms	p.u.	0.26	N/A	N/A	0.02	0.35
	64		phase 2	t1+300ms	p.u.	0.26	N/A	N/A	0.02	0.35
	65		phase 3	t1+300ms	p.u.	0.26	N/A	N/A	0.02	0.35
	66		phase 1	t1+500ms	p.u.	0.27	N/A	N/A	0.02	0.36
	67		phase 2	t1+500ms	p.u.	0.27	N/A	N/A	0.02	0.36
	68		phase 3	t1+500ms	p.u.	0.27	N/A	N/A	0.02	0.36
	69		phase 1	t1+1000ms	p.u.	0.26	N/A	N/A	0.02	0.36
	70		phase 2	t1+1000ms	p.u.	0.26	N/A	N/A	0.02	0.36
	71		phase 3	t1+1000ms	p.u.	0.26	N/A	N/A	0.02	0.36
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.21	1.00	0.20	0.21	1.01

	No.	Parameter	Phase ref.	Time ref.	unit	6.2	6.3	6.4	6.5	7.1
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.159	0.114	0.11	0.126	0.159

	No.	Parameter	Phase ref.	Time ref.	unit	7.2	7.3	7.4	7.5	7.6
General Info.	1	Test number	--	--	--	7.2	7.3	7.4	7.5	7.6
	2	Date	--	--	dd.mm.yyyy	4.3.2025	28.3.2025	28.3.2025	17.3.2025	4.3.2025
	3	Time	--	--	hh:mm:ss.f	5:07:12 PM	5:39:27 PM	5:40:08 PM	2:43:37 PM	5:09:55 PM
	4	Type of fault	--	--	--	3-phase fault	2-phase fault	2-phase fault	3-phase fault	3-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.		1.19	1.19	1.20	
	6	Drop duration setpoint	--	--	ms	103	5022	5022	5002	103
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	5021	5021	5021	5001	5001
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A

	No.	Parameter	Phase ref.	Time ref.	unit	7.2	7.3	7.4	7.5	7.6
	15	Fault duration determined from test	--	--	ms	5021	5021	5021	5001	5001
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	1.19	1.19	1.19	1.20	1.20
	17		pos			1.19	1.09	1.09	1.20	1.20
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.00	1.00	1.00	1.01	1.00
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	1.00	1.01	1.00
	25		pos	t1-1s to t1	p.u.	1.00	1.00	1.00	1.01	1.00
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	0.21	1.00	0.20	0.37	1.00
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	0.31	0.00
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	0.31	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	0.21	1.00	0.20	0.20	1.00
	32	Active power	total	t1-10s to t1	p.u.	0.21	1.00	0.20	0.21	1.00
	33		total	t1-2s to t1	p.u.	0.21	1.00	0.20	0.21	1.00

	No.	Parameter	Phase ref.	Time ref.	unit	7.2	7.3	7.4	7.5	7.6
	34		pos	t1-500ms to t1-100ms	p.u.	0.21	1.00	0.20	0.21	1.00
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	1.88	2.22	2.18	2.21	N/A
	38		neg	--	--	N/A	2.04	2.05	N/A	N/A
	39	Reactive current settling up time	pos	--	ms	53	21	73	64	N/A
	40		neg	--	ms	N/A	34	41	N/A	N/A
	41	Reactive current settling time	pos	--	ms	53	21	73	64	N/A
	42		neg	--	ms	N/A	34	41	N/A	N/A
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	1.19	1.09	1.09	1.20	1.20
	44		neg	t1+100ms to t2-20ms	p.u.	0.00	0.10	0.10	0.00	0.00
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	-0.36	-0.20	-0.20	-0.11	0.01
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	-0.20	-0.20	0.00	0.00
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.36	0.20	0.20	0.11	0.02
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.20	0.20	0.00	0.00
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.02	0.11	0.11	0.02	0.02
	50		pos	t1+100ms to t2-20ms	p.u.	0.02	0.02	0.02	0.02	0.02
	51	Short-circuit	phase1	t1 to	A	121.19	N/A	N/A	124.15	448.69

	No.	Parameter	Phase ref.	Time ref.	unit	7.2	7.3	7.4	7.5	7.6
		currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion		t1+20ms						
	52		phase2	t1 to t1+20ms	A	103.56	N/A	N/A	181.95	437.13
	53		phase3	t1 to t1+20ms	A	65.88	N/A	N/A	198.09	302.43
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	0.08	N/A	N/A	0.16	0.34
	55		phase 2	t1+20ms	p.u.	0.07	N/A	N/A	0.21	0.27
	56		phase 3	t1+20ms	p.u.	0.01	N/A	N/A	0.24	0.12
	57		phase 1	t1+100ms	p.u.	0.34	N/A	N/A	0.09	0.03
	58		phase 2	t1+100ms	p.u.	0.35	N/A	N/A	0.10	0.02
	59		phase 3	t1+100ms	p.u.	0.35	N/A	N/A	0.09	0.02
	60		phase 1	t1+150ms	p.u.	0.35	N/A	N/A	0.10	0.03
	61		phase 2	t1+150ms	p.u.	0.35	N/A	N/A	0.10	0.03
	62		phase 3	t1+150ms	p.u.	0.35	N/A	N/A	0.10	0.03
	63		phase 1	t1+300ms	p.u.	0.35	N/A	N/A	0.11	0.03
	64		phase 2	t1+300ms	p.u.	0.35	N/A	N/A	0.11	0.03
	65		phase 3	t1+300ms	p.u.	0.35	N/A	N/A	0.11	0.03
	66		phase 1	t1+500ms	p.u.	0.36	N/A	N/A	0.11	0.02
	67		phase 2	t1+500ms	p.u.	0.36	N/A	N/A	0.11	0.02
	68		phase 3	t1+500ms	p.u.	0.36	N/A	N/A	0.11	0.02
	69		phase 1	t1+1000ms	p.u.	0.35	N/A	N/A	0.11	0.03
	70		phase 2	t1+1000ms	p.u.	0.35	N/A	N/A	0.11	0.03
	71		phase 3	t1+1000ms	p.u.	0.35	N/A	N/A	0.11	0.03
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	0.21	1.00	0.20	0.21	1.00

	No.	Parameter	Phase ref.	Time ref.	unit	7.2	7.3	7.4	7.5	7.6
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.159	0.115	0.112	0.133	0.161

	No.	Parameter	Phase ref.	Time ref.	unit	7.7	8.1	8.2	8.3	8.4
General Info.	1	Test number	--	--	--	7.7	8.1	8.2	8.3	8.4
	2	Date	--	--	dd.mm.yyyy	4.3.2025	4.3.2025	4.3.2025	17.3.2025	17.3.2025
	3	Time	--	--	hh:mm:ss.f	5:10:57 PM	5:11:33 PM	5:12:05 PM	2:44:14 PM	2:44:49 PM
	4	Type of fault	--	--	--	2-phase fault	3-phase fault	3-phase fault	2-phase fault	2-phase fault
	5	Drop depth setpoint	Phase conductor	--	p.u.		1.25	1.25	1.24	1.23
	6	Drop duration setpoint	--	--	ms	103	103	103	103	103
	7	Value of the sries impedance X1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	8	Value of the series impedance R1, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	9	Value of the short-circuit impedance X2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	10	Value of the short-circuit impedance R2, if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	11	Connection series impedance(t0), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A
	12	Fault occurrence (t1)	--	--	ms	0	0	0	0	0
	13	Fault clearance (t2)	--	--	ms	5001	121	121	102	102
	14	Bridging series impedance (t3), if applicable	--	--	Ω	N/A	N/A	N/A	N/A	N/A

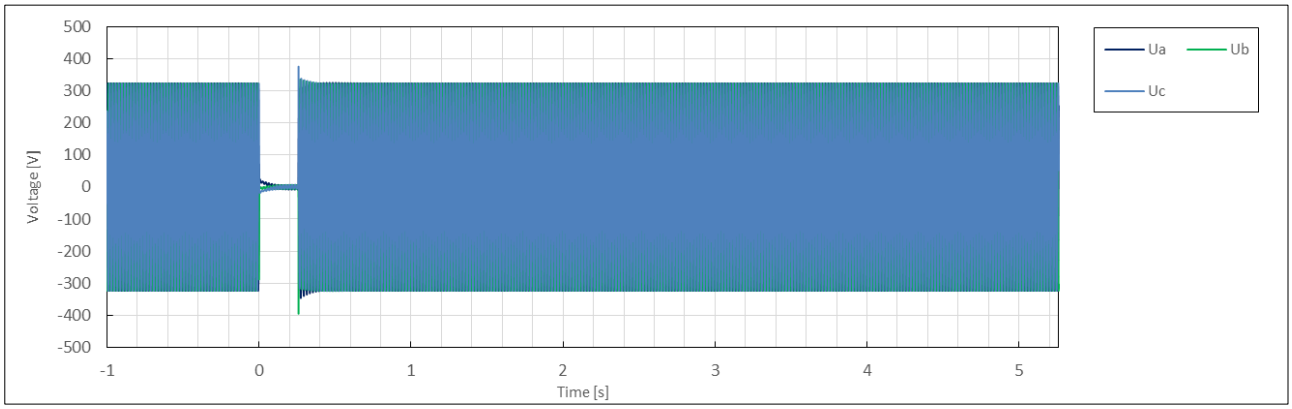
	No.	Parameter	Phase ref.	Time ref.	unit	7.7	8.1	8.2	8.3	8.4
	15	Fault duration determined from test	--	--	ms	5001	121	121	102	102
	16	Actual value of voltage drop / increase	Phase conductor	t1+100ms to t2 and t1-60s to t1	p.u.	1.20	1.24	1.24	1.24	1.23
	17		pos			1.10	1.24	1.24	1.12	1.12
Before t0	18	Voltage	pos	t0-500ms to t0-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	19	Current	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	20	Active power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
	21	Reactive power	pos	t0-500ms to to-100ms	p.u.	N/A	N/A	N/A	N/A	N/A
Before t1	22	Voltage	pos	t1-60s to t1	p.u.	1.01	1.01	1.00	1.01	1.00
	23		neg	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	24		pos	t1-500ms to t1-100ms	p.u.	1.01	1.01	1.00	1.01	1.00
	25		pos	t1-1s to t1	p.u.	1.01	1.01	1.00	1.01	1.00
	26		neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	27	Current	pos	t1-500ms to t1-100ms	p.u.	1.00	1.00	0.21	1.00	0.21
	28	Reactive current	pos	t1-60s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	29		pos	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	30	Reactive current	neg	t1-1s to t1	p.u.	0.00	0.00	0.00	0.00	0.00
	31	Active current	pos	t1-1s to t1	p.u.	1.00	1.00	0.21	1.00	0.21
	32	Active power	total	t1-10s to t1	p.u.	1.00	1.01	0.21	1.00	0.21
	33		total	t1-2s to t1	p.u.	1.00	1.01	0.21	1.00	0.21

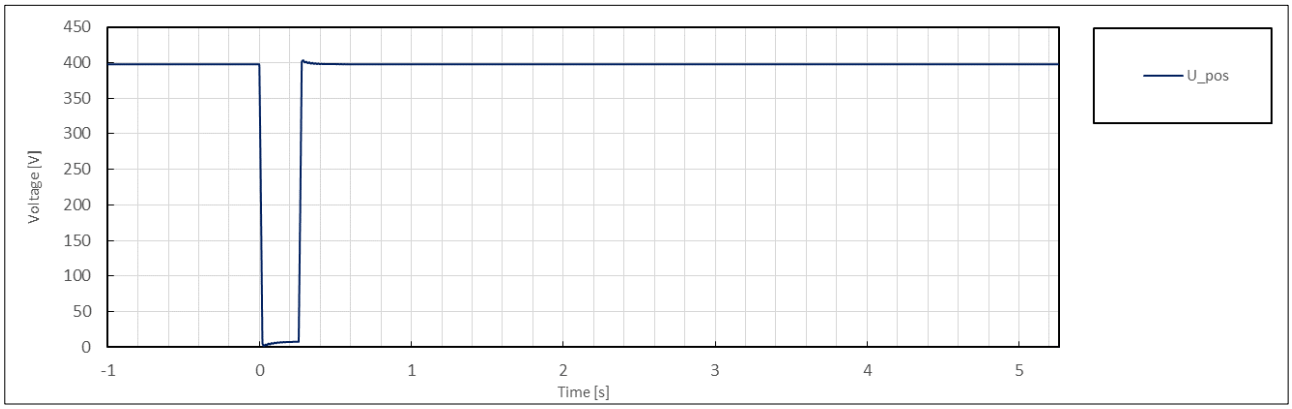
	No.	Parameter	Phase ref.	Time ref.	unit	7.7	8.1	8.2	8.3	8.4
	34		pos	t1-500ms to t1-100ms	p.u.	1.00	1.01	0.21	1.00	0.21
	35	Reactive power	pos	t1-500ms to t1-100ms	p.u.	0.00	0.00	0.00	0.00	0.00
	36	Wind speed (WT only)	--	t1-2s to t1	m/s	N/A	N/A	N/A	N/A	N/A
t1 to t2	37	Determined proportionality constant K-factor	pos	--	--	N/A	1.87	1.86	1.85	1.82
	38		neg	--	--	N/A	N/A	N/A	1.98	1.95
	39	Reactive current settling up time	pos	--	ms	N/A	47	48	28	49
	40		neg	--	ms	N/A	N/A	N/A	48	49
	41	Reactive current settling time	pos	--	ms	N/A	47	48	28	49
	42		neg	--	ms	N/A	N/A	N/A	58	59
	43	Voltage	pos	t1+100ms to t2-20ms	p.u.	1.10	1.24	1.24	1.12	1.12
	44		neg	t1+100ms to t2-20ms	p.u.	0.10	0.00	0.00	0.12	0.12
	45	Reactive current	pos	t1+100ms to t2-20ms	p.u.	0.01	-0.44	-0.44	-0.21	-0.21
	46		neg	t1+100ms to t2-20ms	p.u.	0.00	0.00	0.00	-0.23	-0.23
	47	Apparent current	pos	t1+100ms to t2-20ms	p.u.	0.02	0.44	0.44	0.21	0.21
	48		neg	t1+100ms to t2-20ms	p.u.	0.00	0.00	0.00	0.23	0.23
	49	Active power	total	t1+100ms to t2-20ms	p.u.	0.02	0.02	0.01	0.12	0.12
	50		pos	t1+100ms to t2-20ms	p.u.	0.02	0.02	0.01	0.02	0.02
	51	Short-circuit	phase1	t1 to	A	N/A	452.84	138.69	N/A	N/A

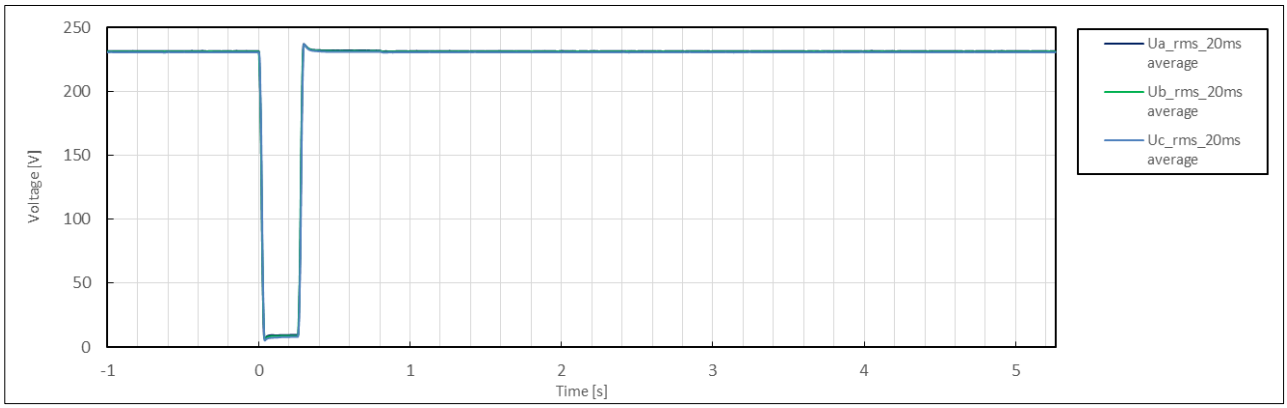
	No.	Parameter	Phase ref.	Time ref.	unit	7.7	8.1	8.2	8.3	8.4
		currents, only for 3-phase fault Highes instantaneous values of current including any decaying DC current portion		t1+20ms						
	52		phase2	t1 to t1+20ms	A	N/A	457.46	148.77	N/A	N/A
	53		phase3	t1 to t1+20ms	A	N/A	338.88	131.75	N/A	N/A
	54	Short-circuit currents, only for 3-phase fault 1-period rms value	phase 1	t1+20ms	p.u.	N/A	0.39	0.10	N/A	N/A
	55		phase 2	t1+20ms	p.u.	N/A	0.27	0.08	N/A	N/A
	56		phase 3	t1+20ms	p.u.	N/A	0.25	0.04	N/A	N/A
	57		phase 1	t1+100ms	p.u.	N/A	0.43	0.43	N/A	N/A
	58		phase 2	t1+100ms	p.u.	N/A	0.45	0.44	N/A	N/A
	59		phase 3	t1+100ms	p.u.	N/A	0.43	0.44	N/A	N/A
	60		phase 1	t1+150ms	p.u.	N/A	0.10	0.12	N/A	N/A
	61		phase 2	t1+150ms	p.u.	N/A	0.10	0.12	N/A	N/A
	62		phase 3	t1+150ms	p.u.	N/A	0.10	0.12	N/A	N/A
	63		phase 1	t1+300ms	p.u.	N/A	1.01	0.20	N/A	N/A
	64		phase 2	t1+300ms	p.u.	N/A	1.01	0.20	N/A	N/A
	65		phase 3	t1+300ms	p.u.	N/A	1.01	0.20	N/A	N/A
	66		phase 1	t1+500ms	p.u.	N/A	0.99	0.21	N/A	N/A
	67		phase 2	t1+500ms	p.u.	N/A	0.99	0.21	N/A	N/A
	68		phase 3	t1+500ms	p.u.	N/A	0.99	0.21	N/A	N/A
	69		phase 1	t1+1000ms	p.u.	N/A	0.99	0.21	N/A	N/A
	70		phase 2	t1+1000ms	p.u.	N/A	0.99	0.21	N/A	N/A
	71		phase 3	t1+1000ms	p.u.	N/A	0.99	0.21	N/A	N/A
After t2	72	Active power	total	t2+1s to t2+10s	p.u.	1.00	1.01	0.21	1.00	0.21

	No.	Parameter	Phase ref.	Time ref.	unit	7.7	8.1	8.2	8.3	8.4
	73	Wind speed (WT only)	--	t2+1s to t2+10s	m/s	N/A	N/A	N/A	N/A	N/A
	74	Active current rise time	pos	--	s	0.157	0.16	0.161	0.116	0.113

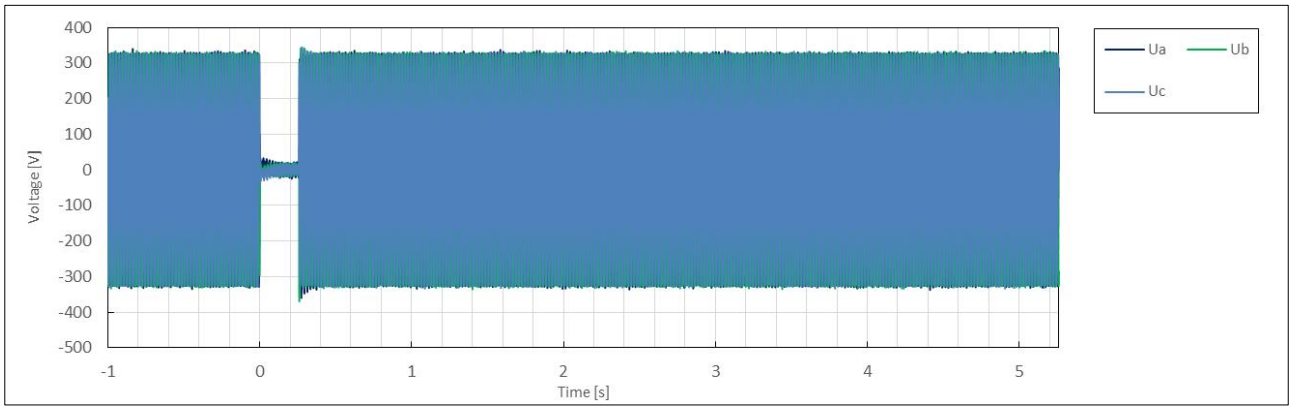
No. 1.1 Idle Test

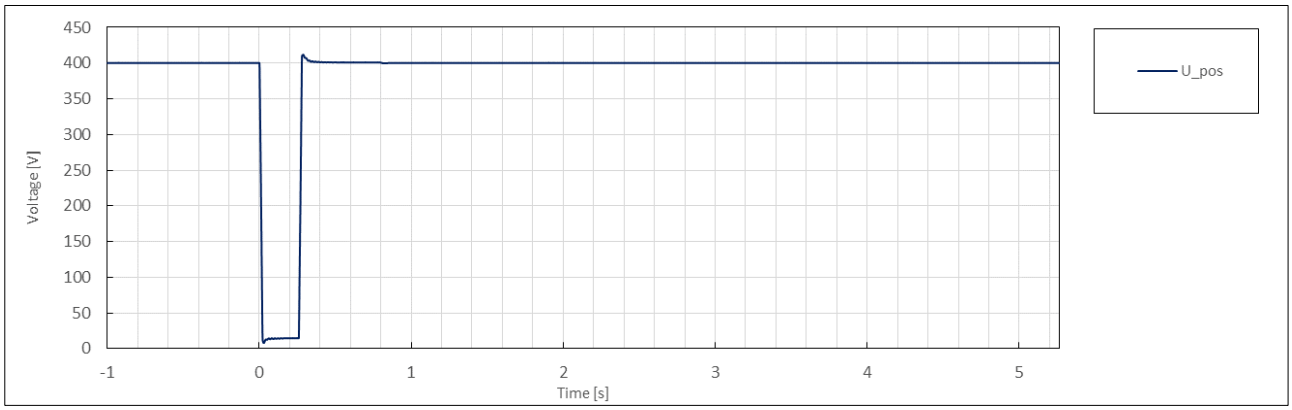


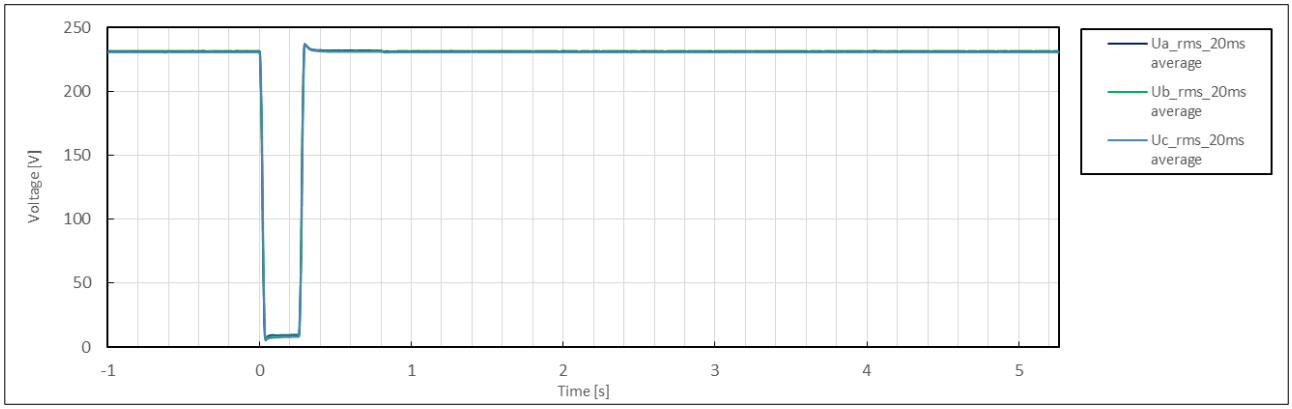


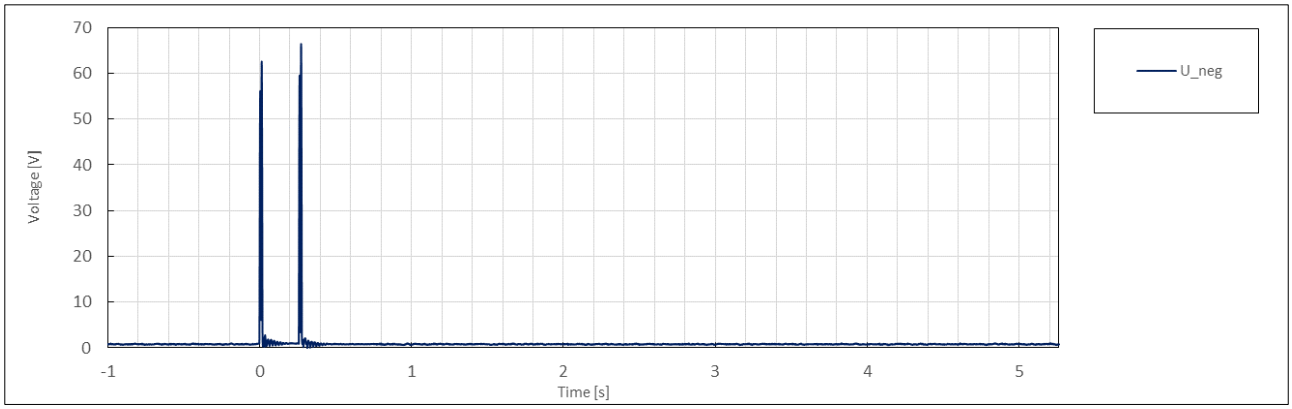


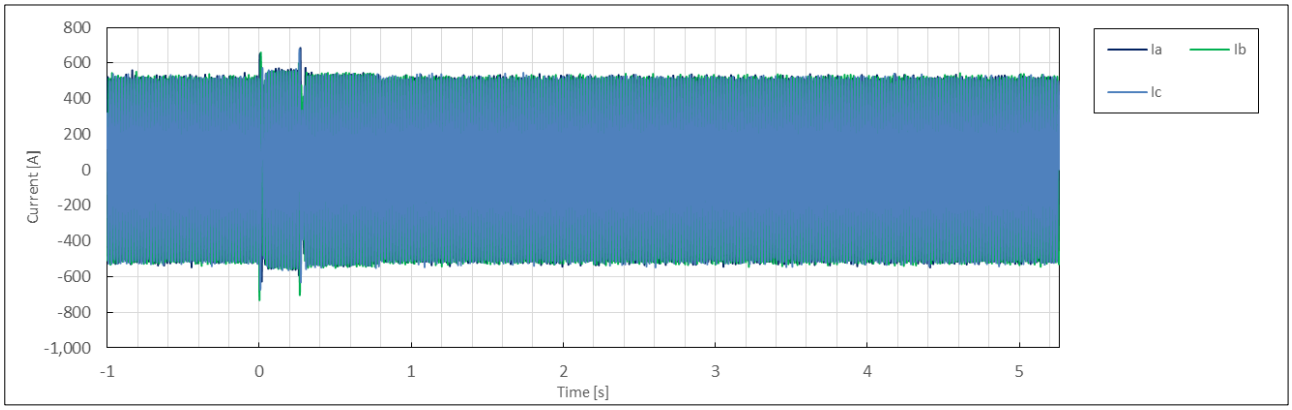
No. 1.1 Load Test

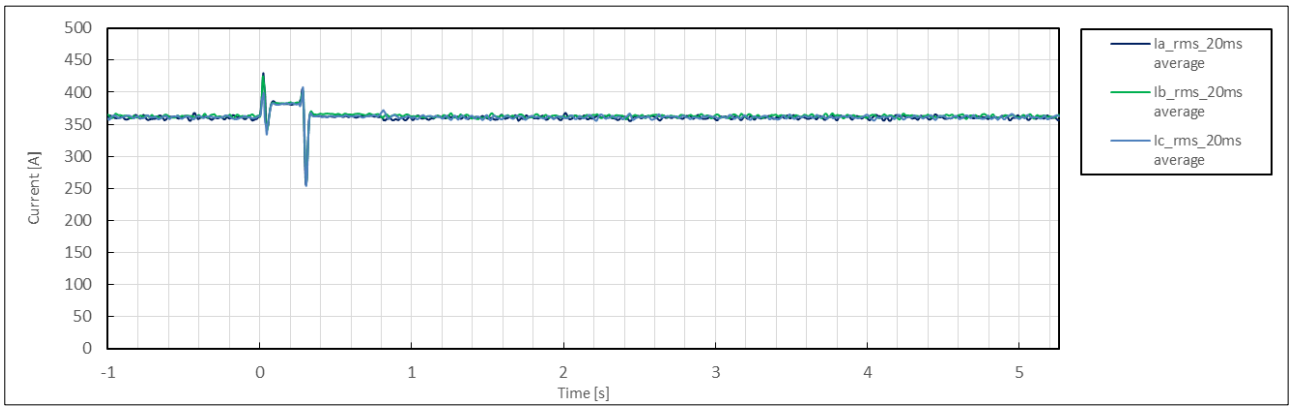


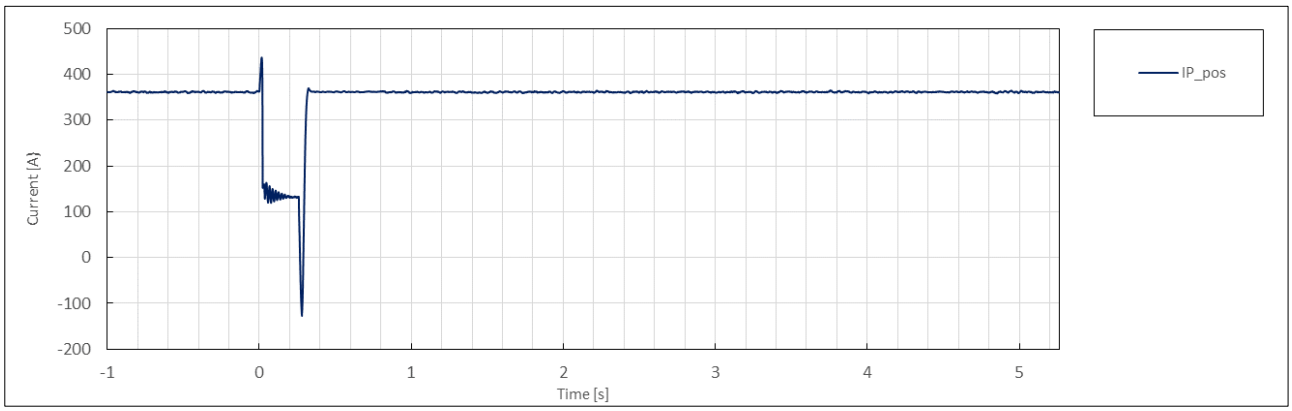


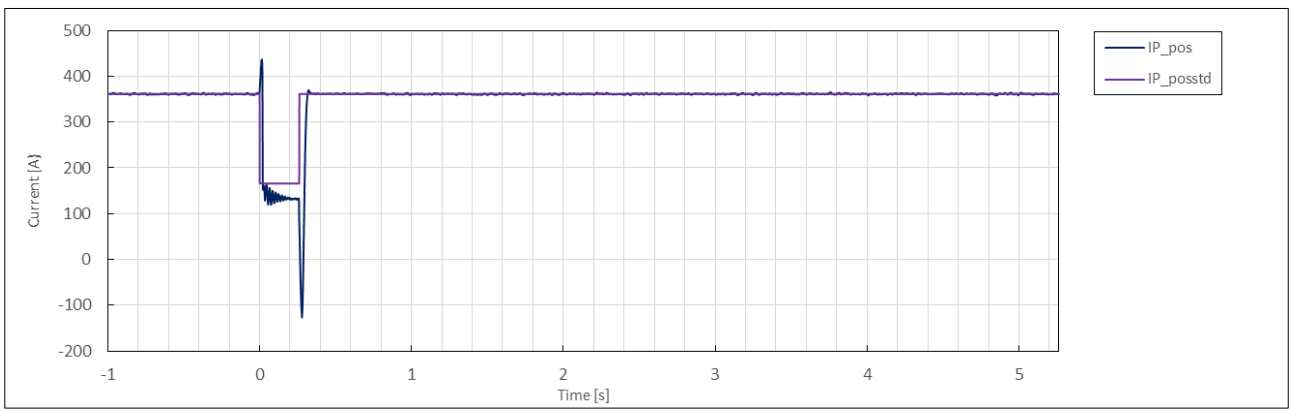


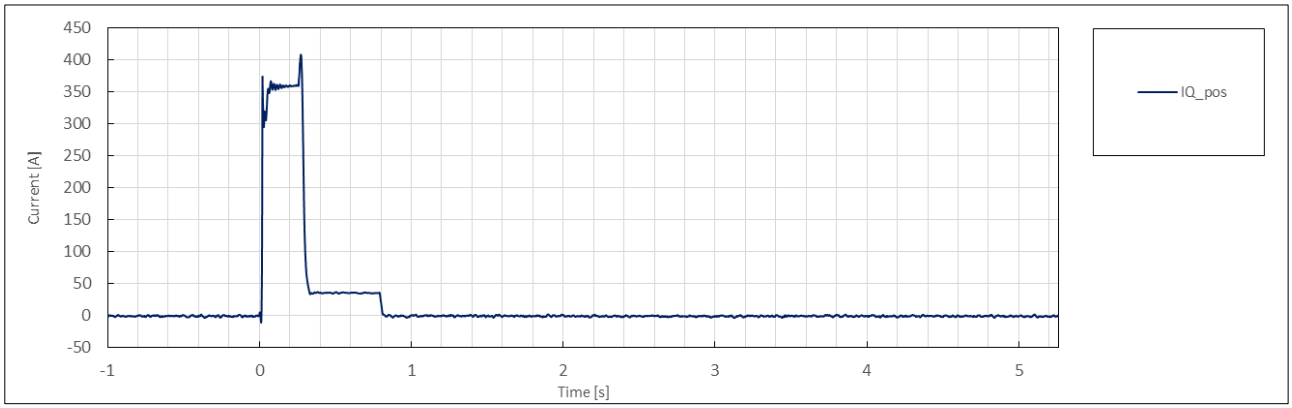


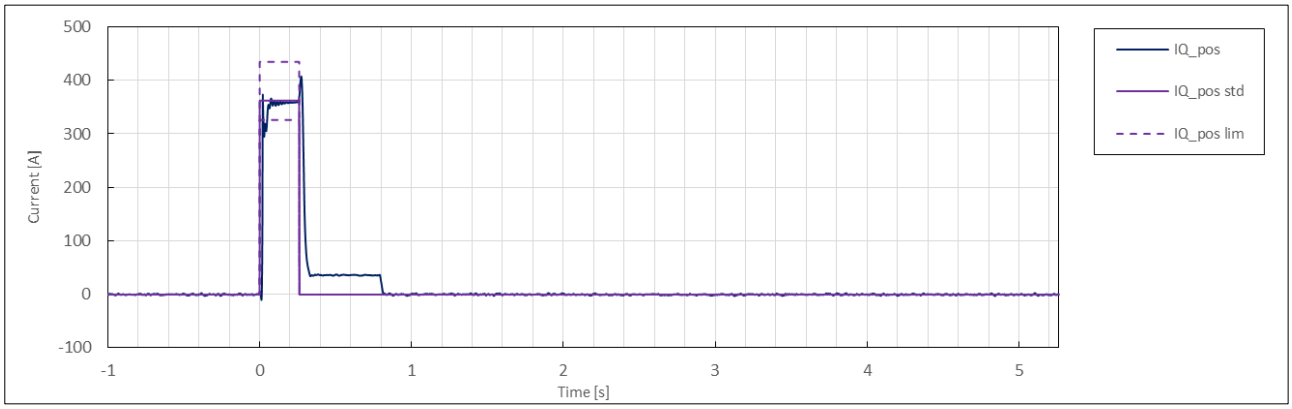

Current [A]
Time [s]
Ia
Ib
Ic

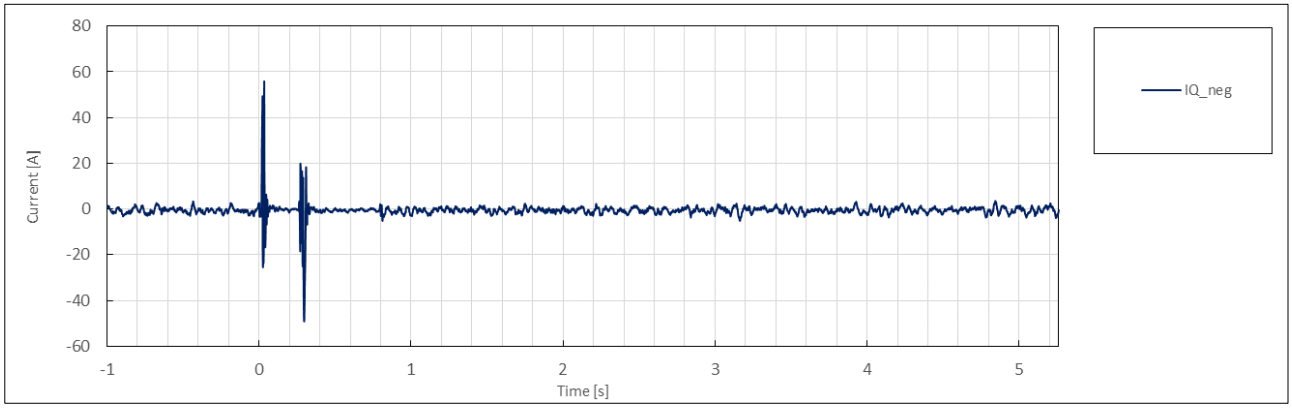

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

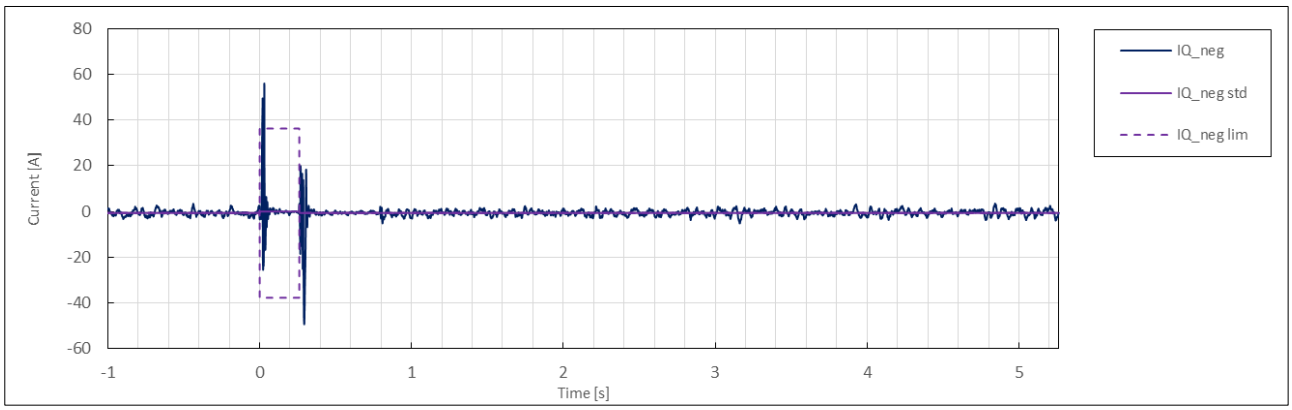

Current [A]
Time [s]
IP_pos

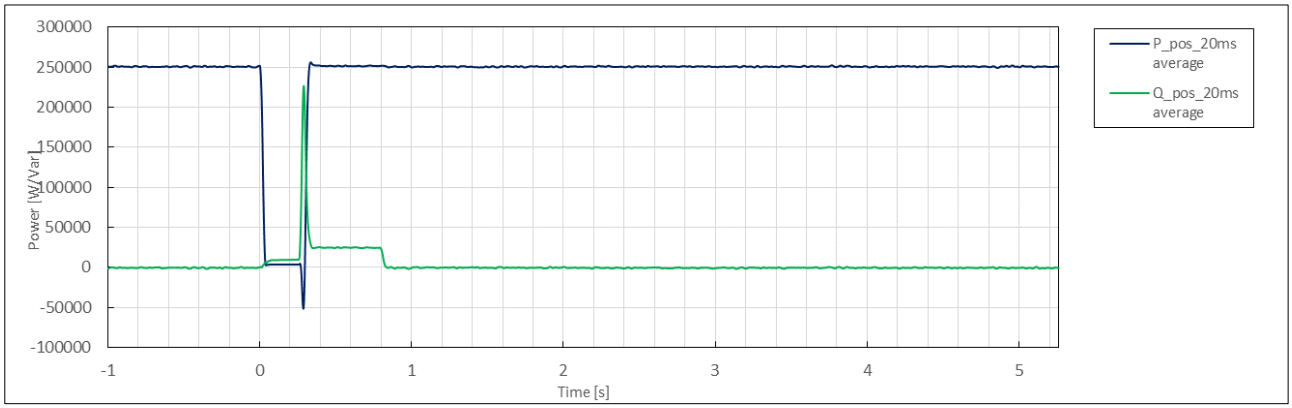

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

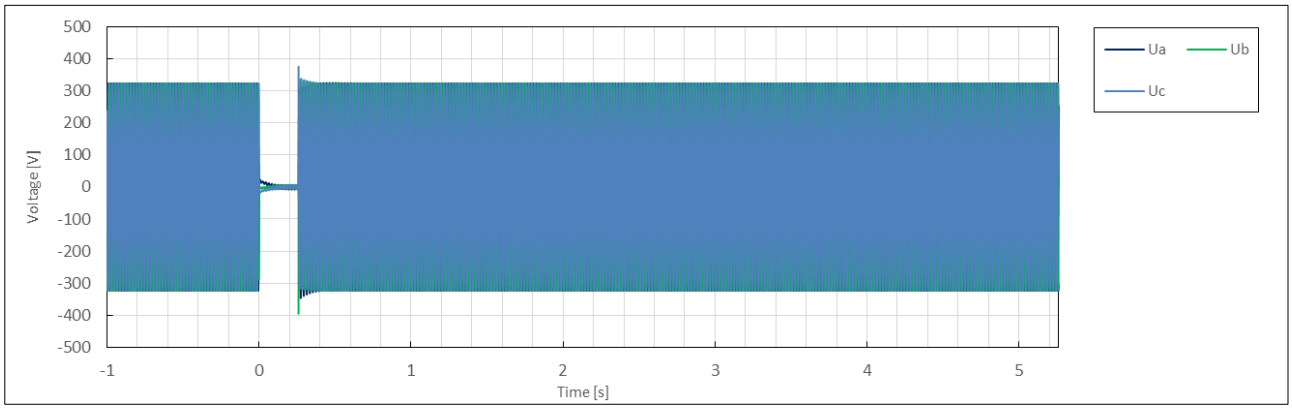

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

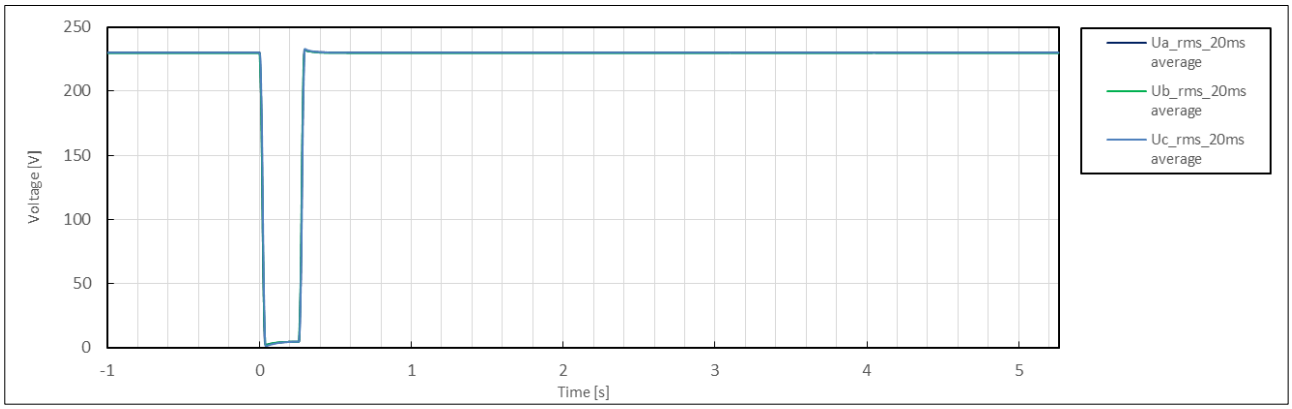

Current [A]
Time [s]
IQ_neg

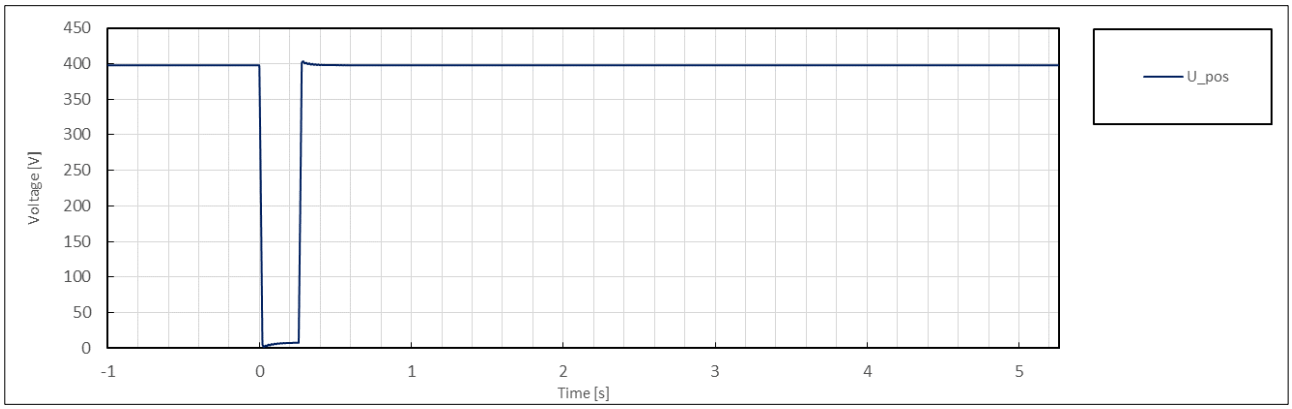

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

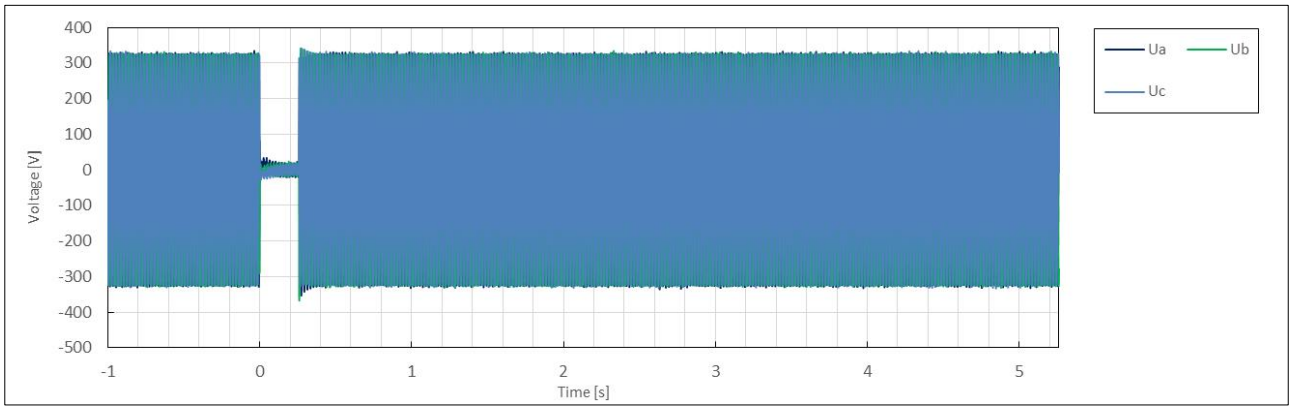
No. 1.2 Idle Test

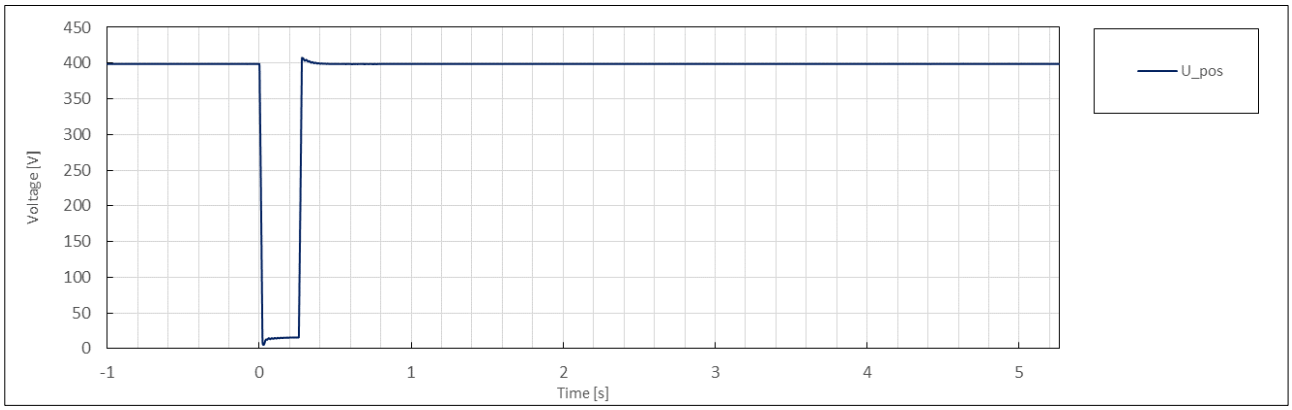


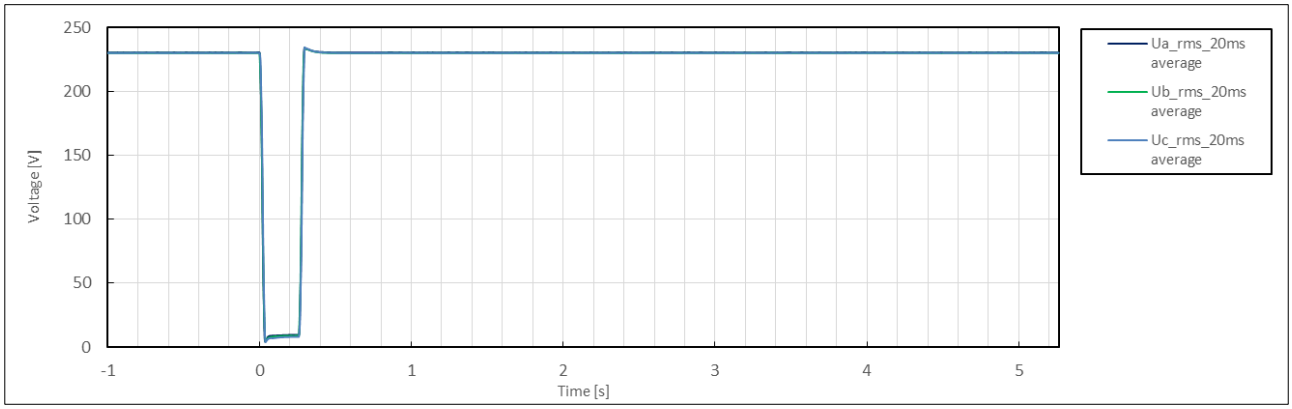


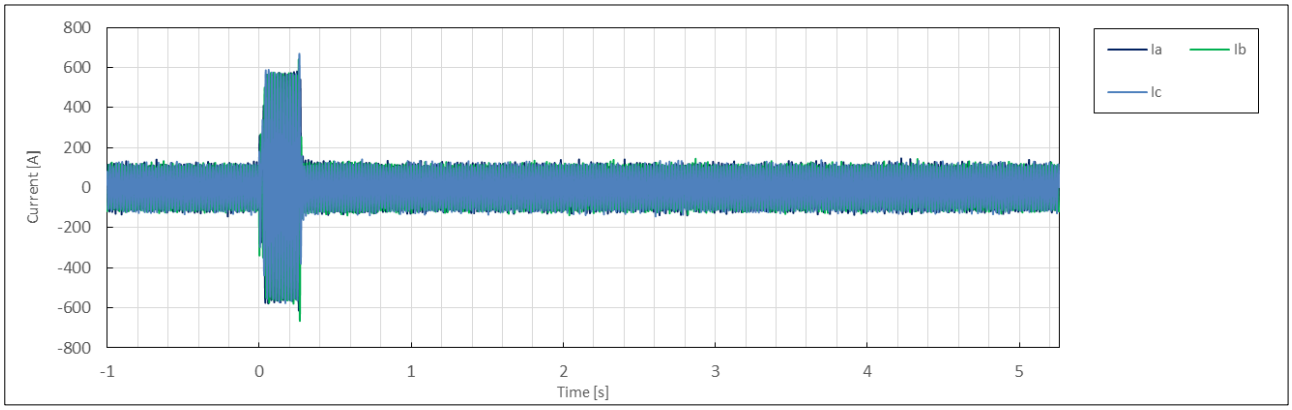


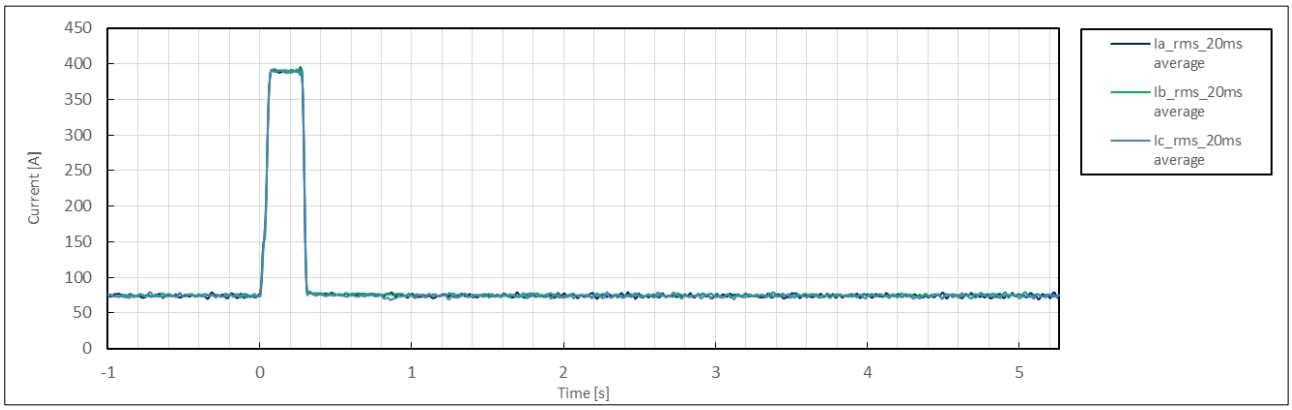
No. 1.2 Load Test

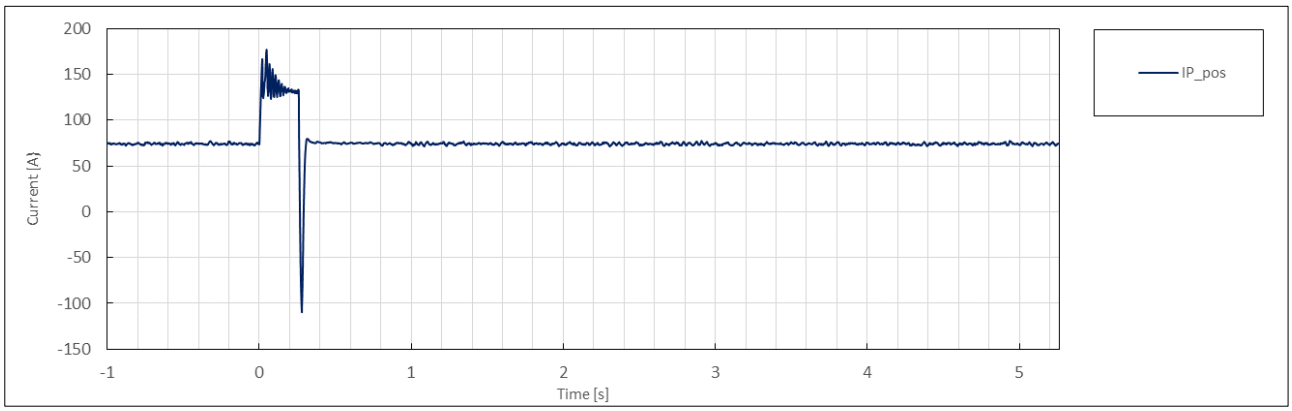


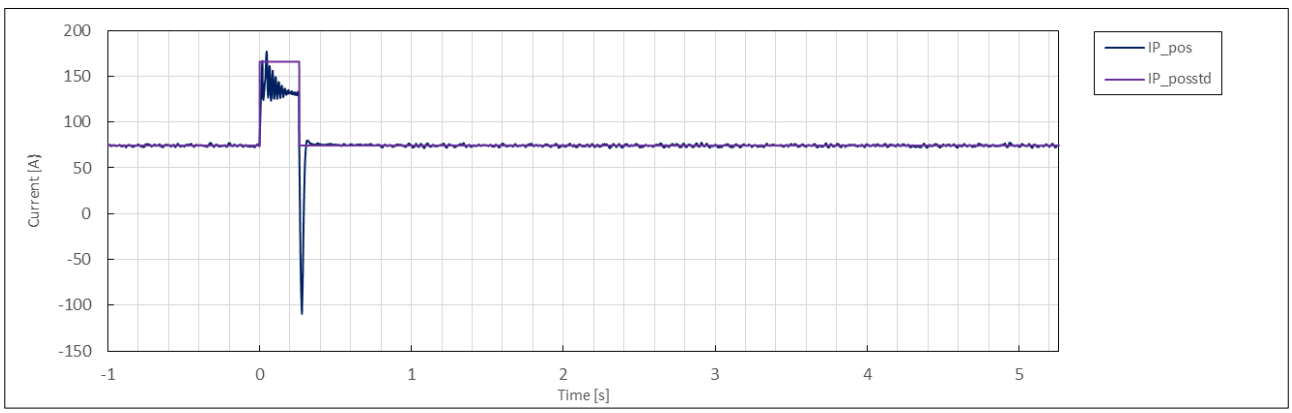


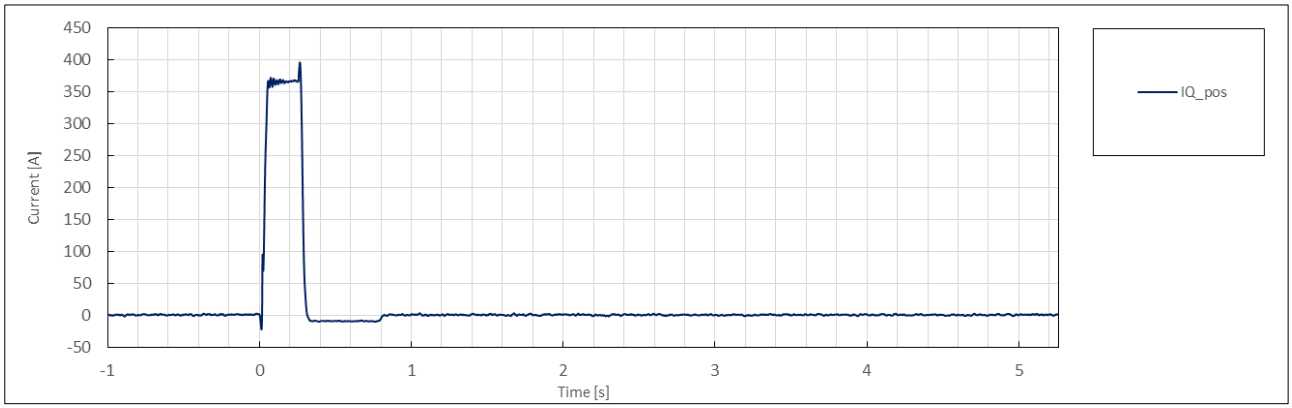


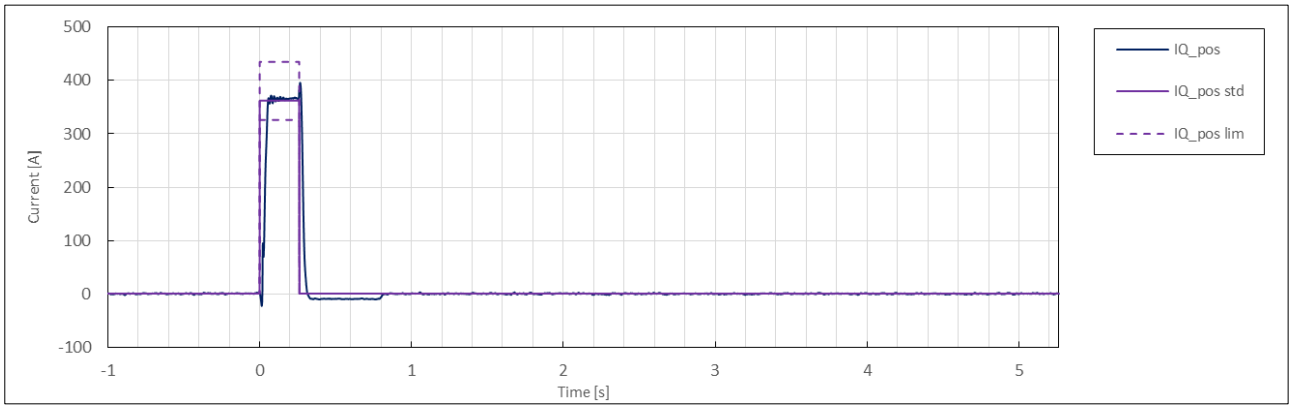

Current [A]
Time [s]
Ia
Ib
Ic

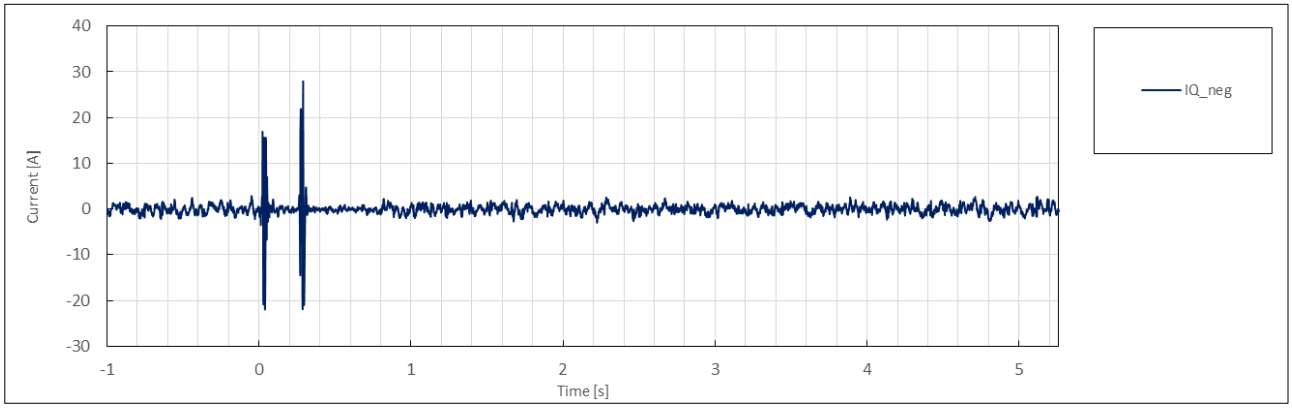

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

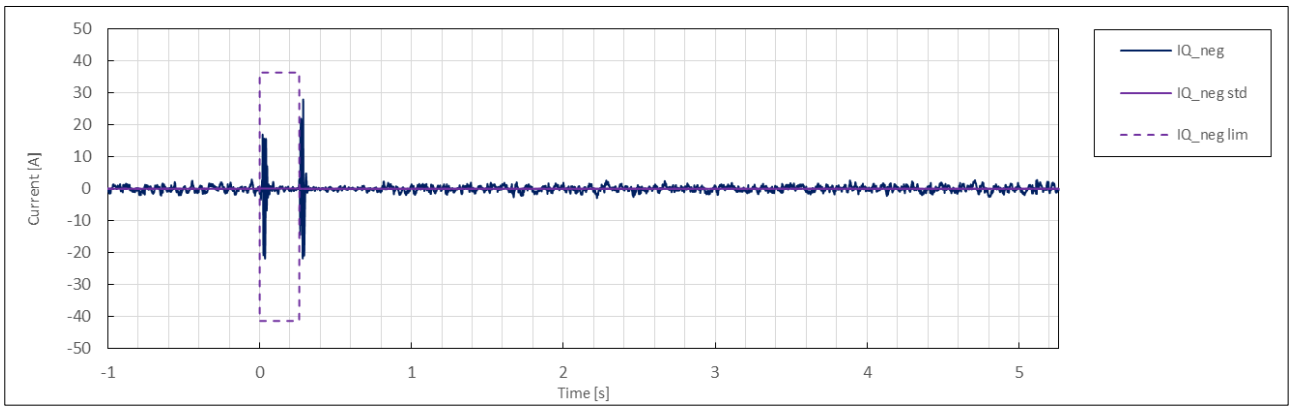

Current [A]
Time [s]
IP_pos

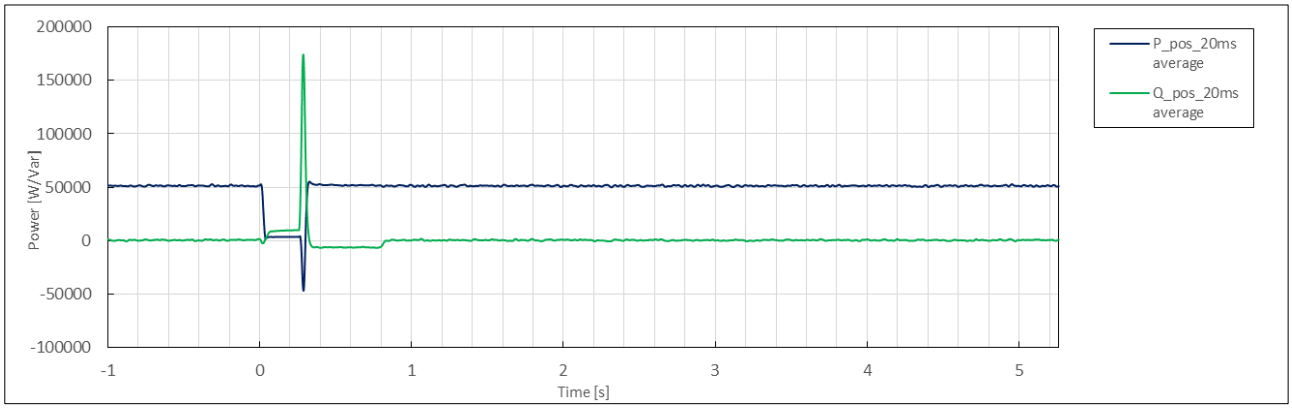

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

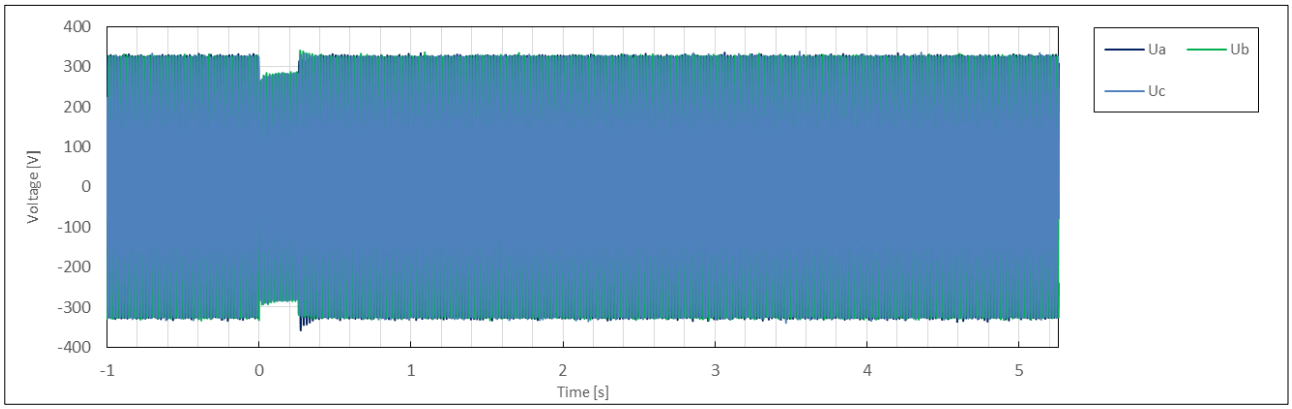

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

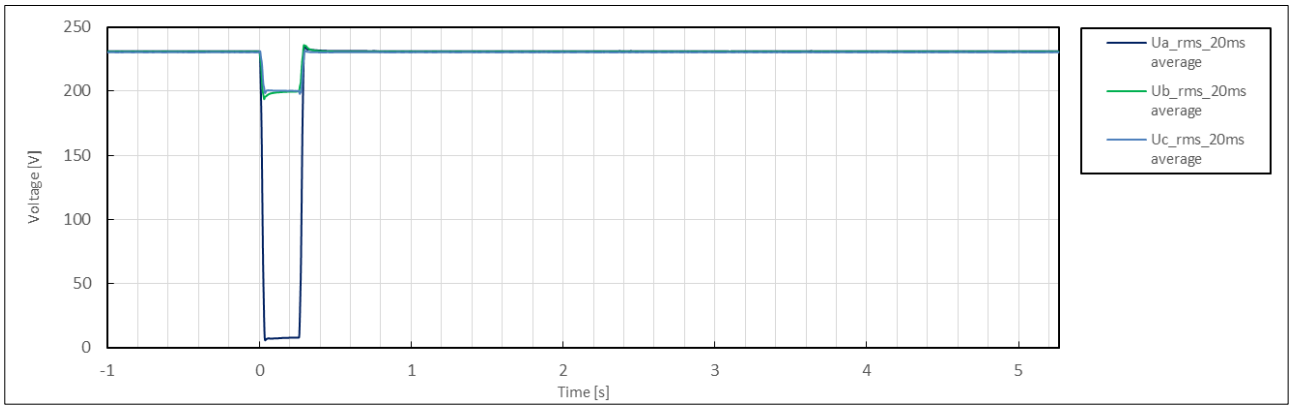

Current [A]
Time [s]
IQ_neg

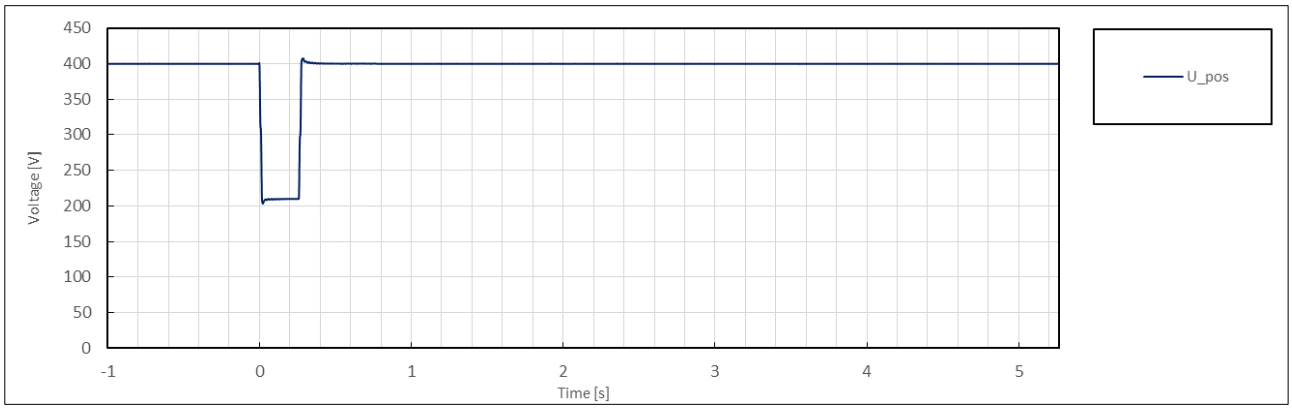

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


200000
150000
100000
50000
0
-50000
-100000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

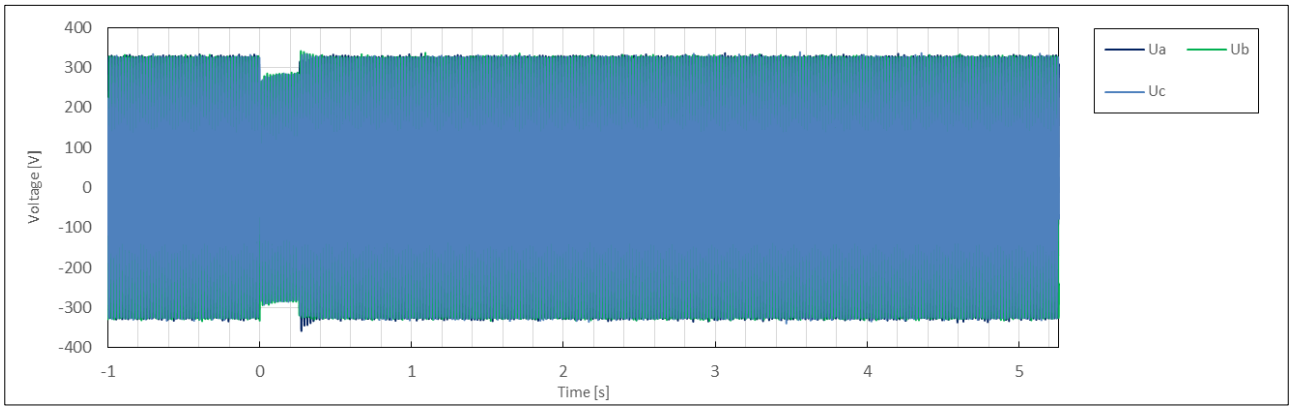
No. 1.3 Idle Test

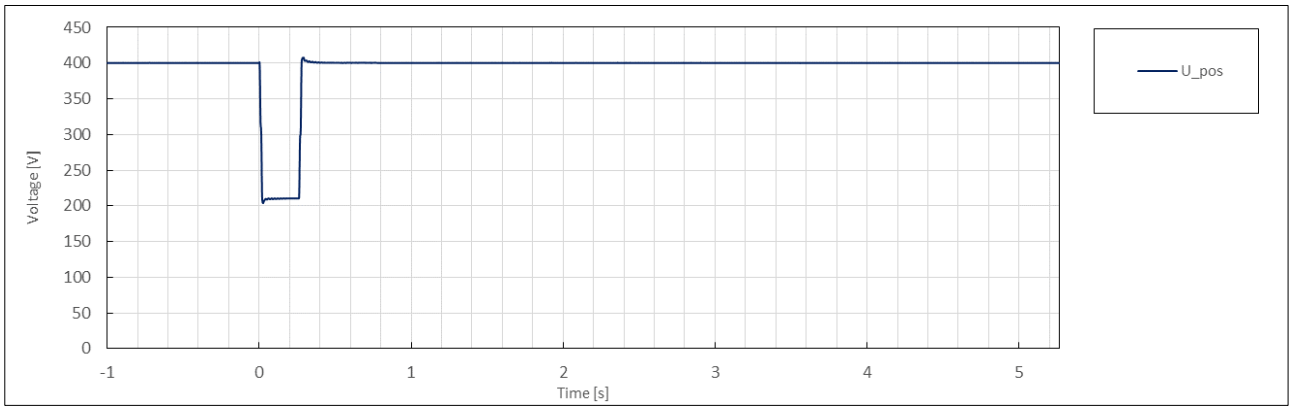


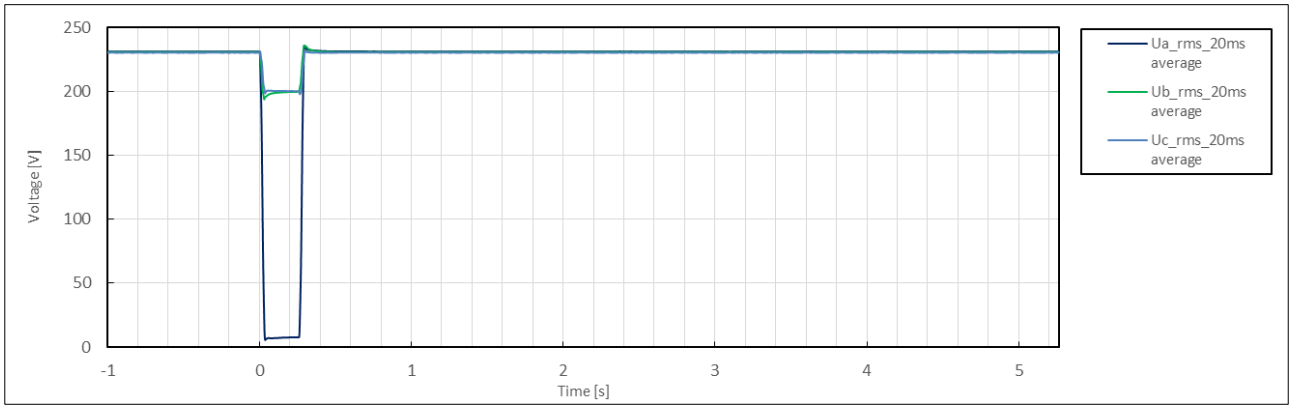


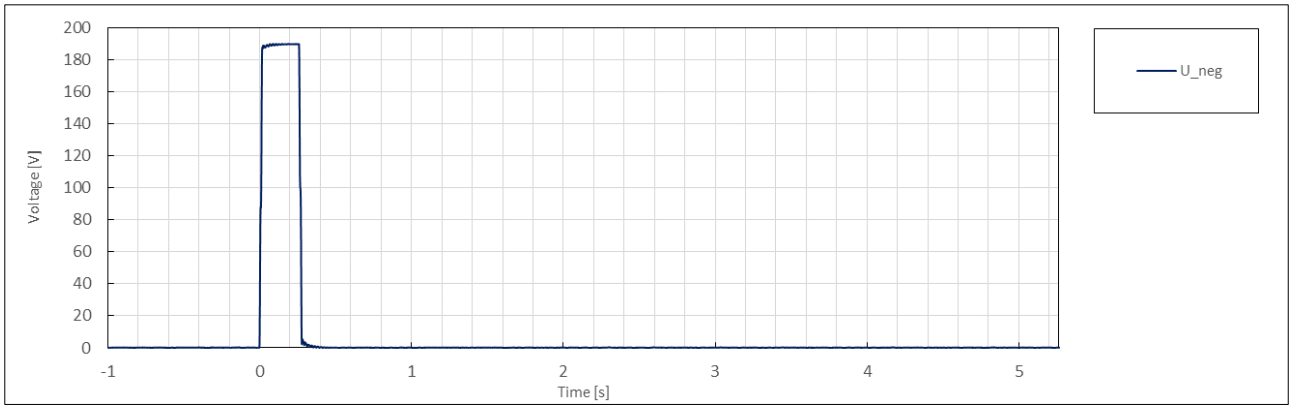


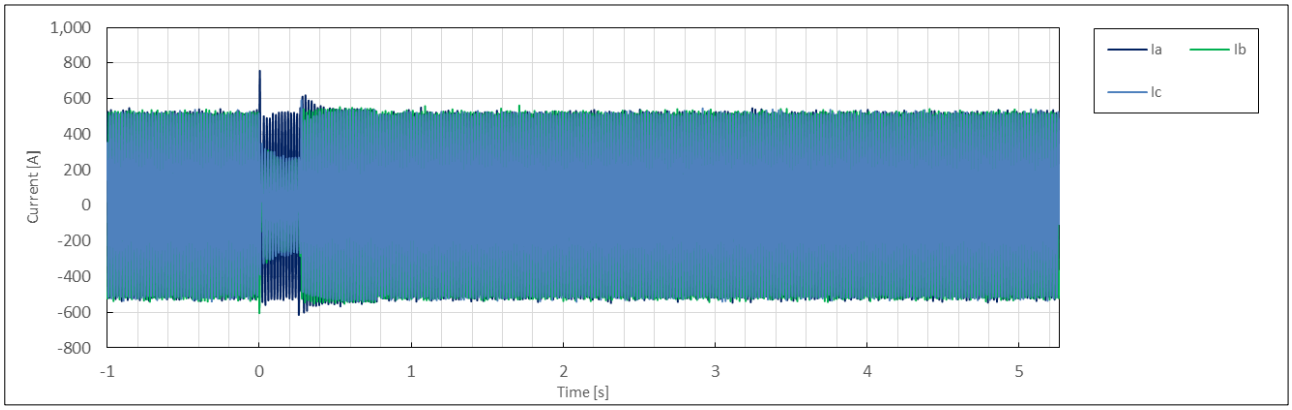
No. 1.3 Load Test

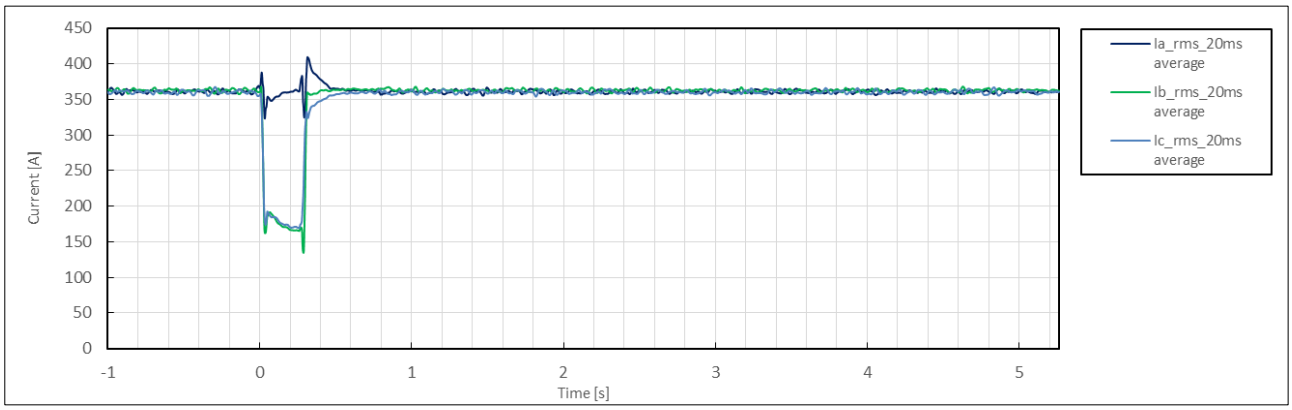


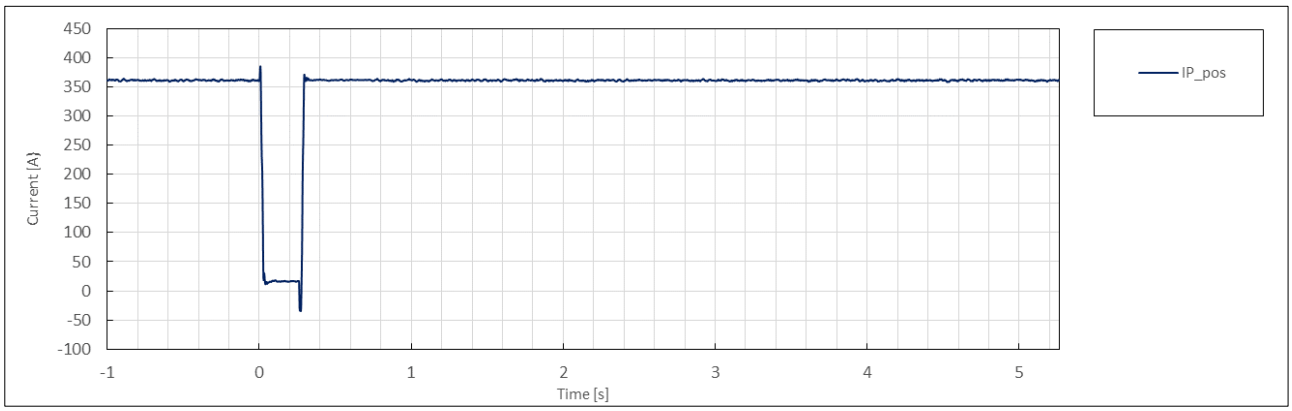


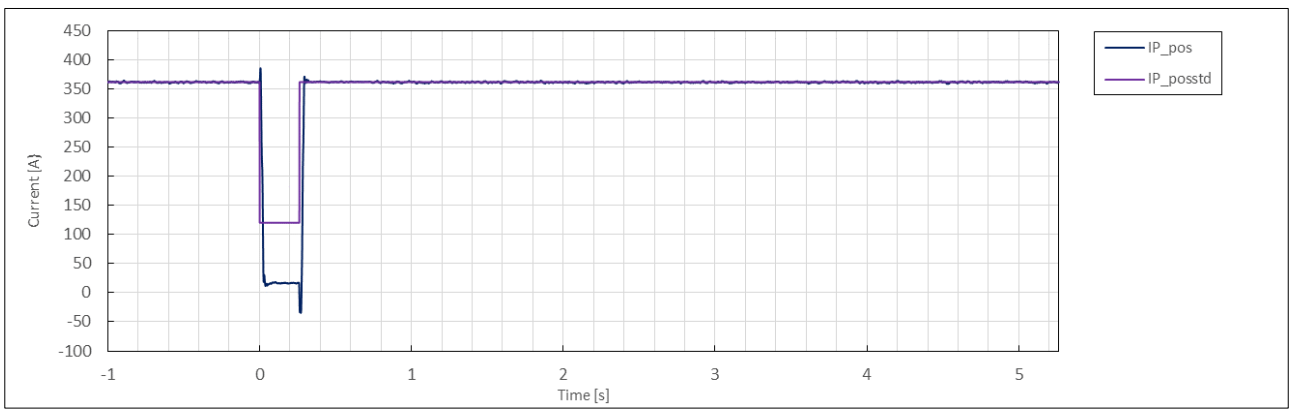


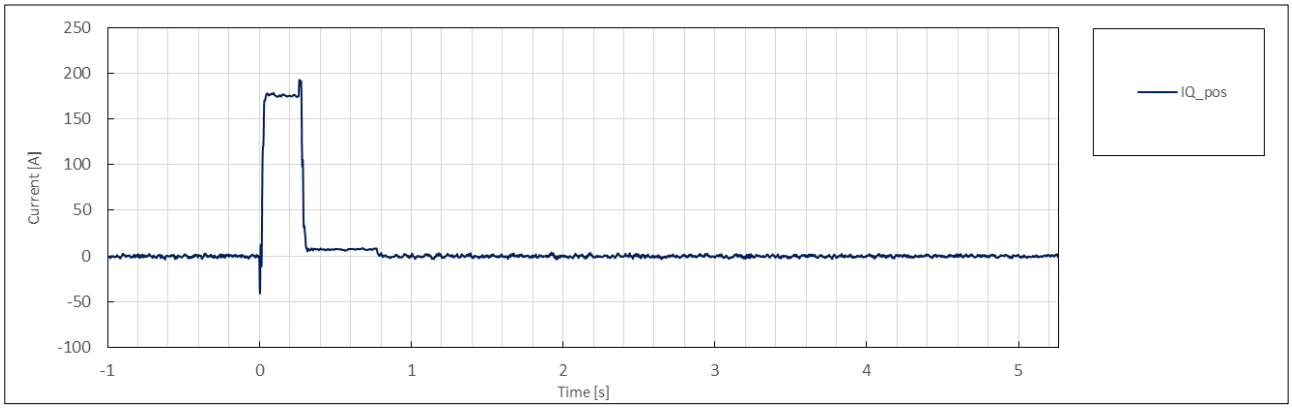


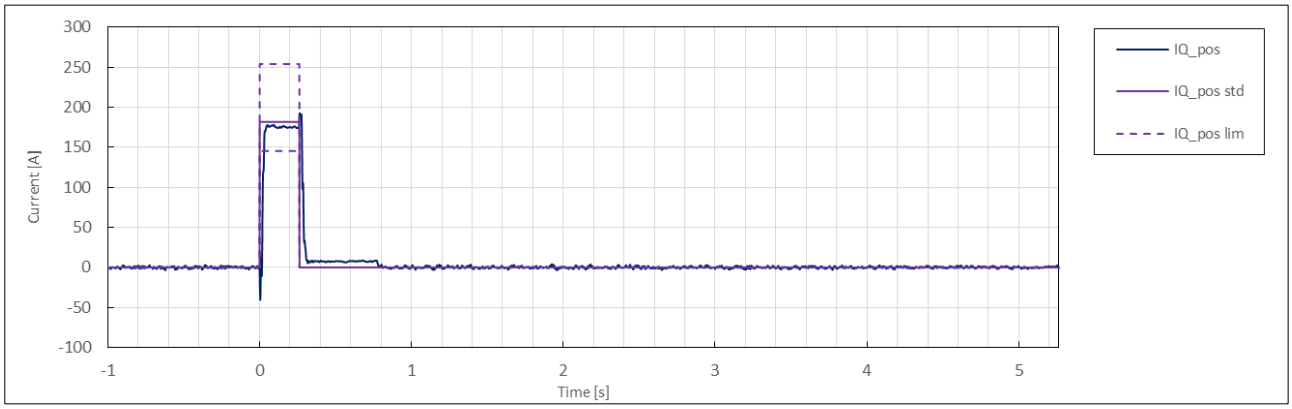

1,000
800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
0
1
2
3
4
5
Time [s]
Ia
Ib
Ic

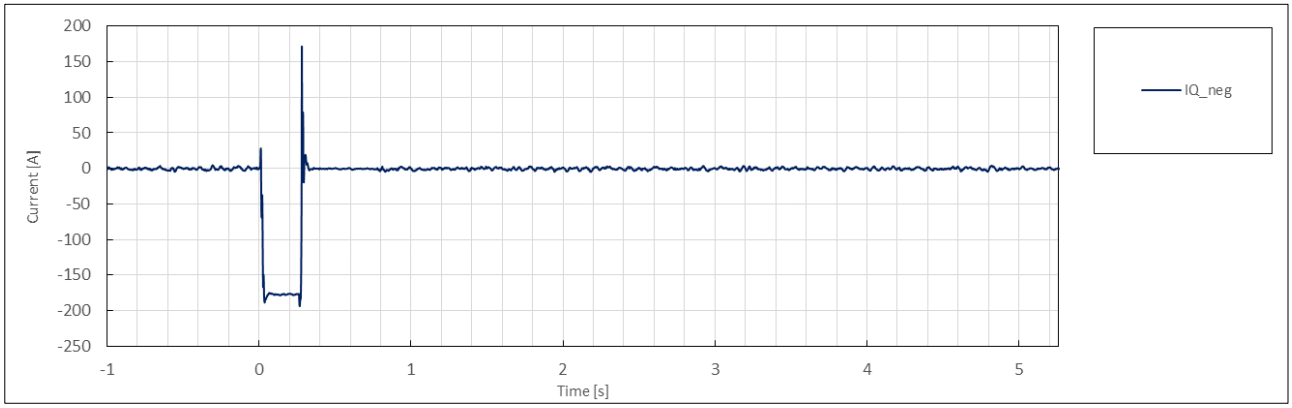

450
400
350
300
250
200
150
100
50
0
Current [A]
-1
0
1
2
3
4
5
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

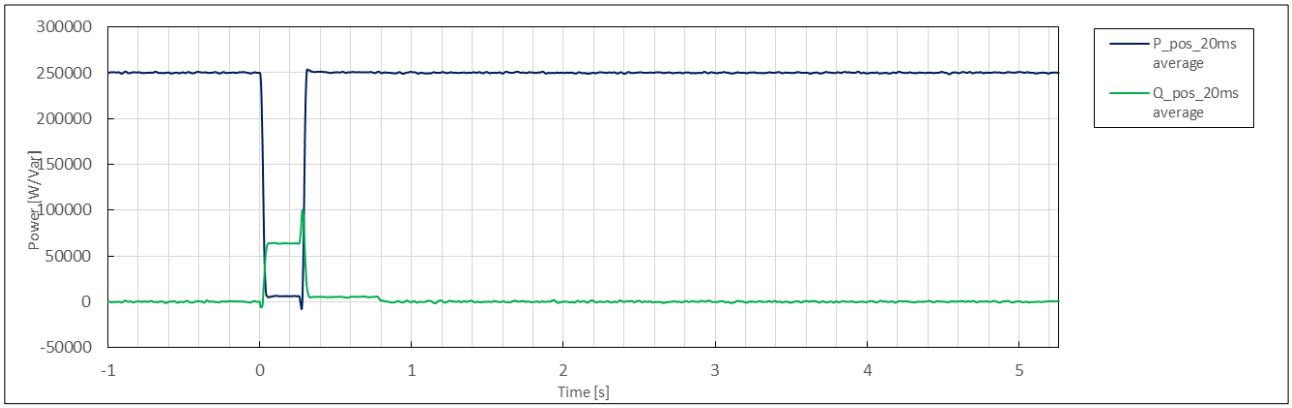

450
400
350
300
250
200
150
100
50
0
-50
-100
Current [A]
-1
0
1
2
3
4
5
Time [s]
IP_pos


450
400
350
300
250
200
150
100
50
0
-50
-100
Current [A]
-1
0
1
2
3
4
5
Time [s]
IP_pos
IP_posstd

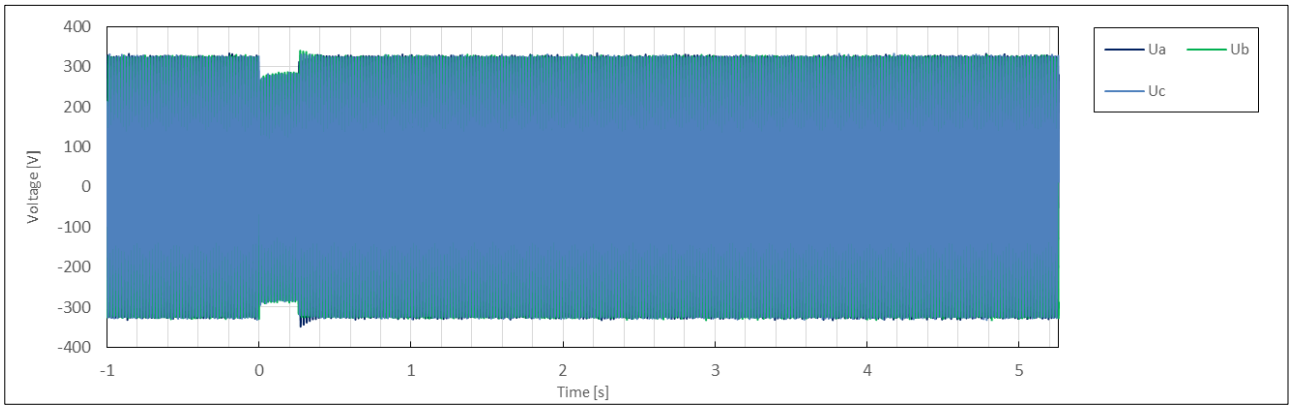

250
200
150
100
50
0
-50
-100
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos

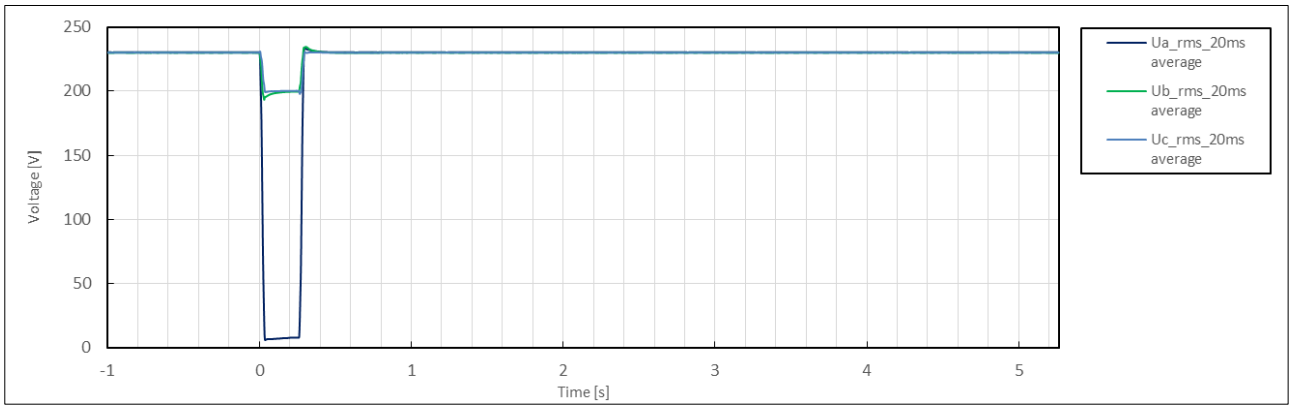

300
250
200
150
100
50
0
-50
-100
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim


200
150
100
50
0
-50
-100
-150
-200
-250
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg

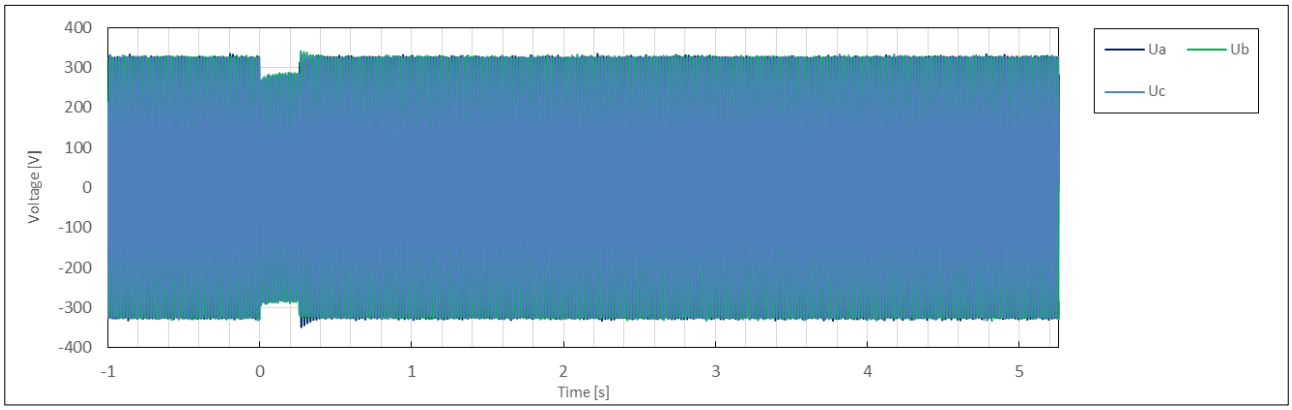

300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

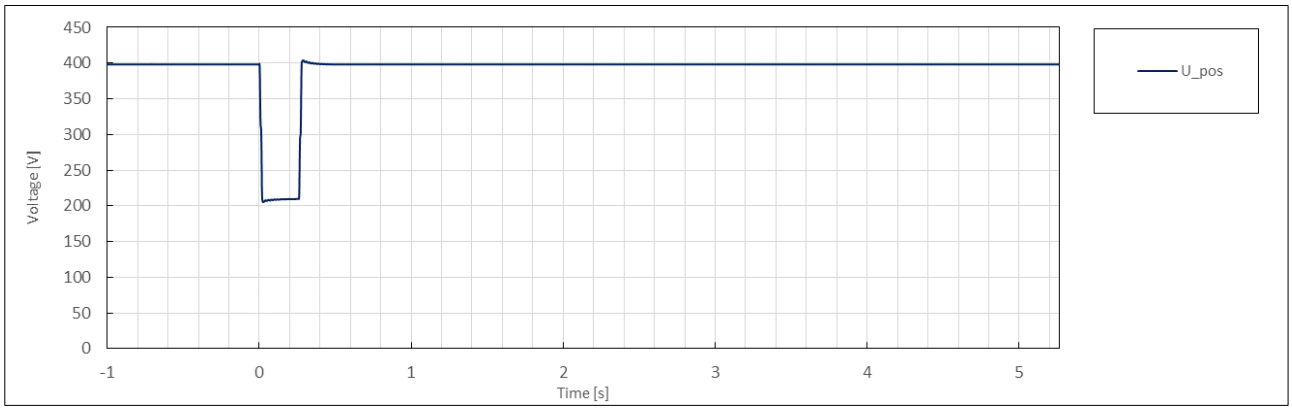
No. 1.4 Idle Test

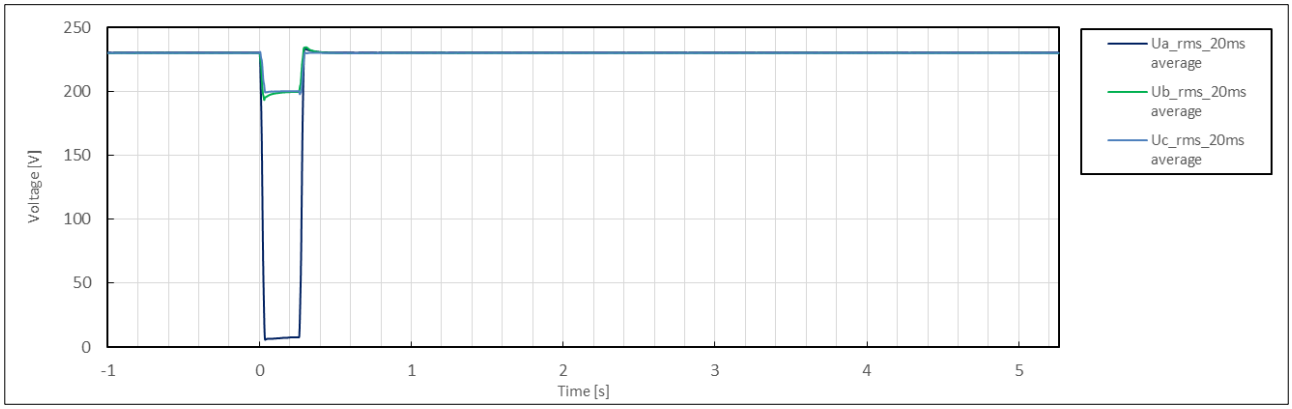


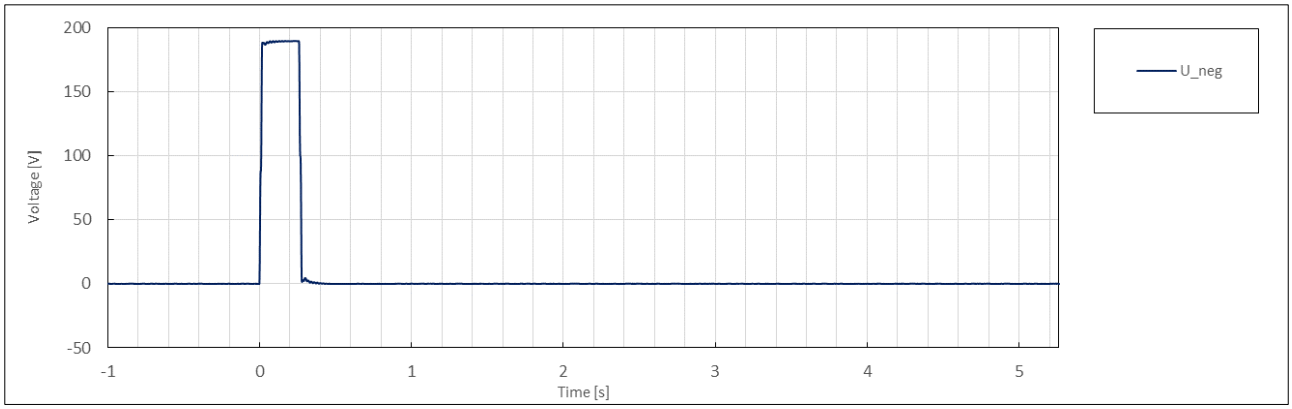


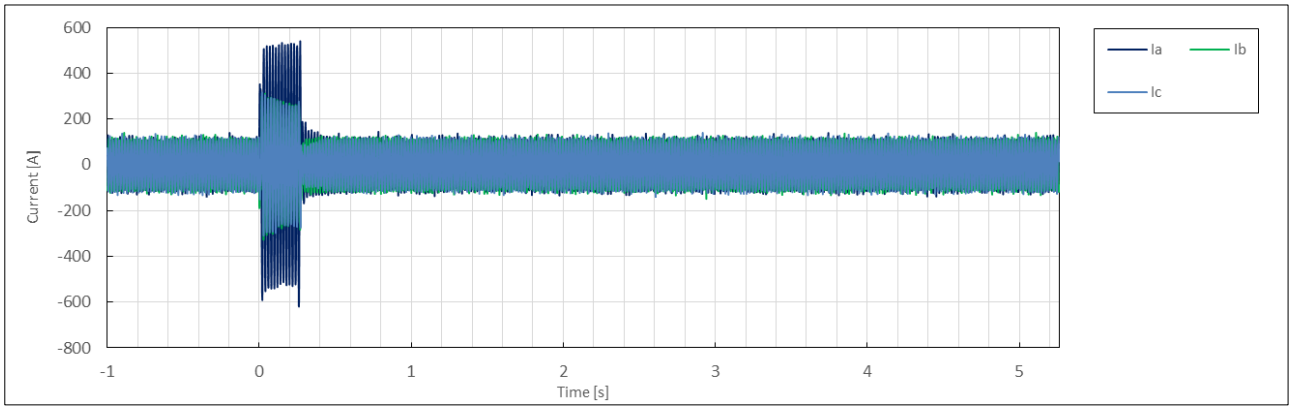
No. 1.4 Load Test

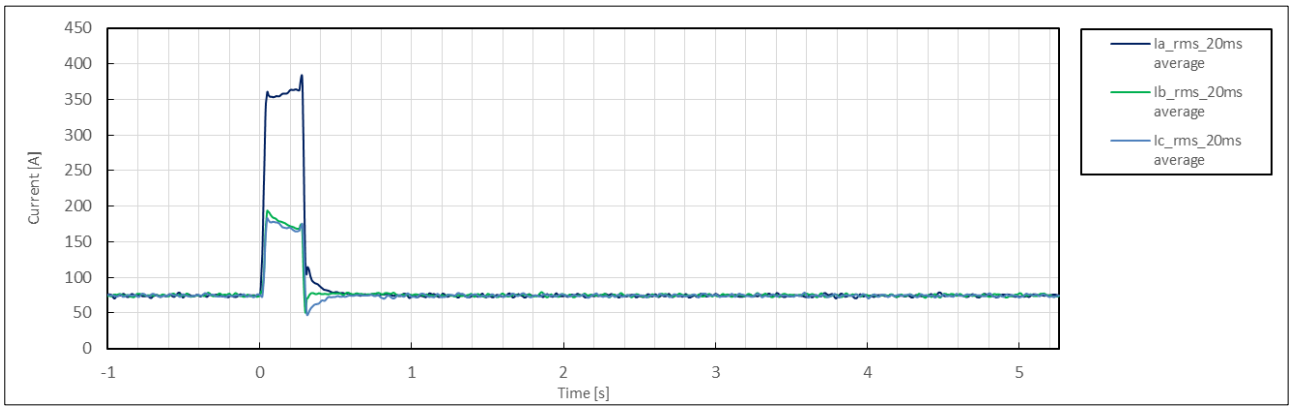


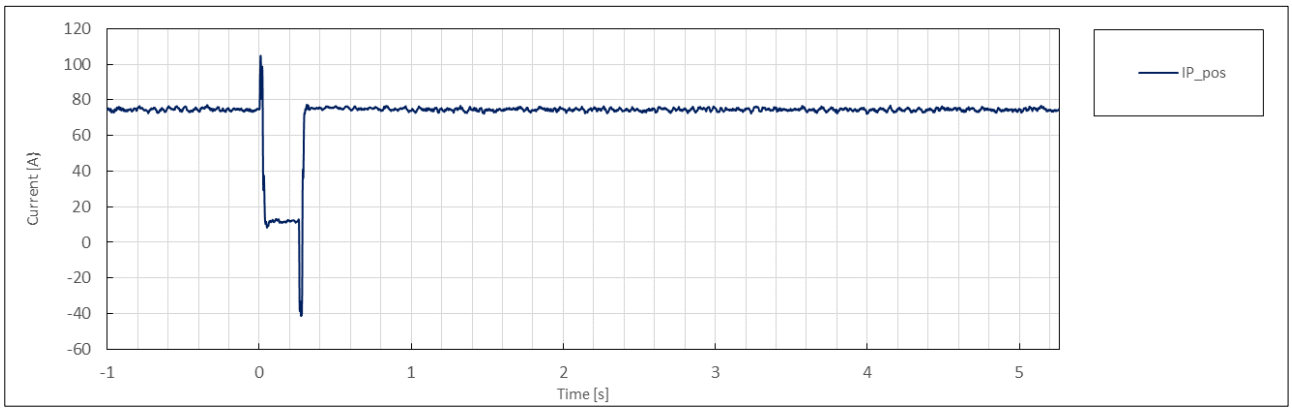


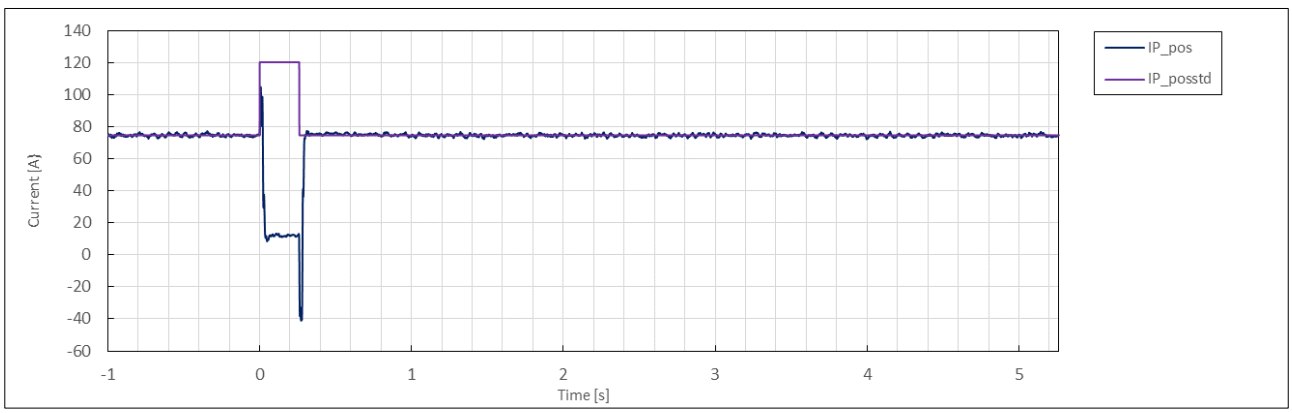


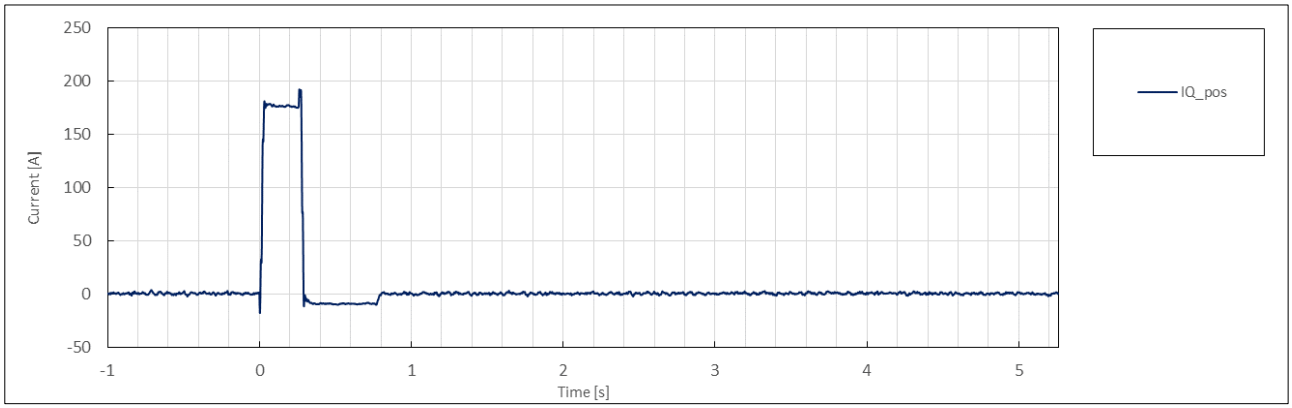


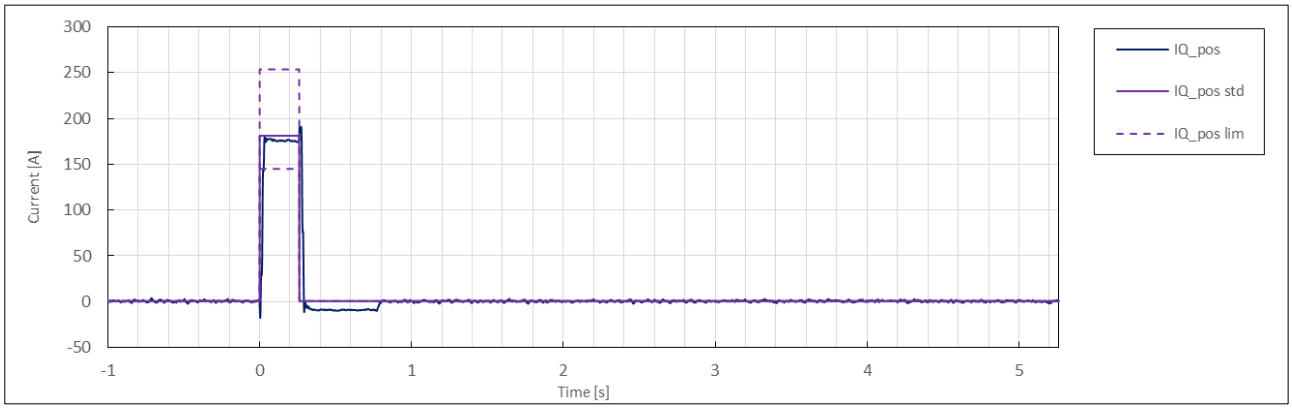

Current [A]
Time [s]
Ia
Ib
Ic

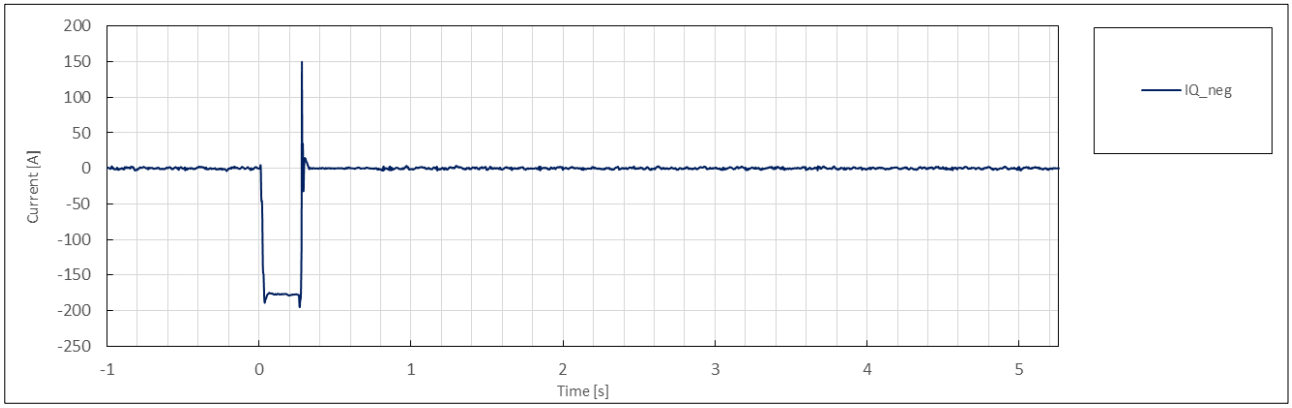

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

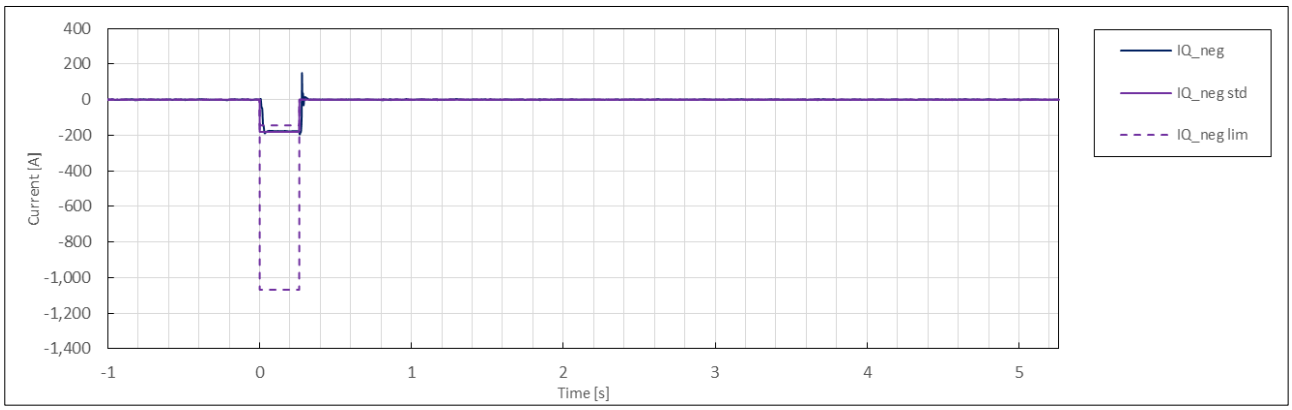

Current [A]
Time [s]
IP_pos

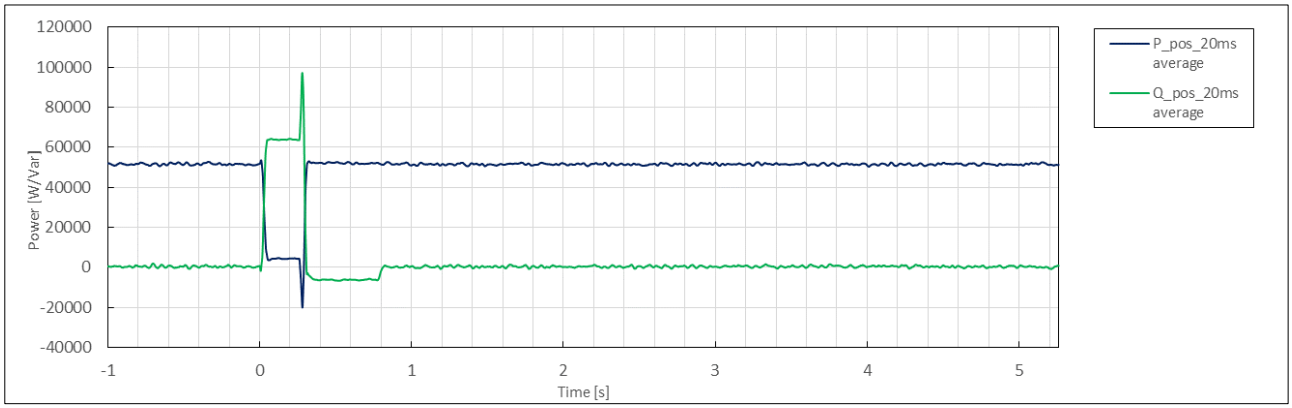

Current [A]
Time [s]
IP_pos
IP_posstd


250
200
150
100
50
0
-50
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos

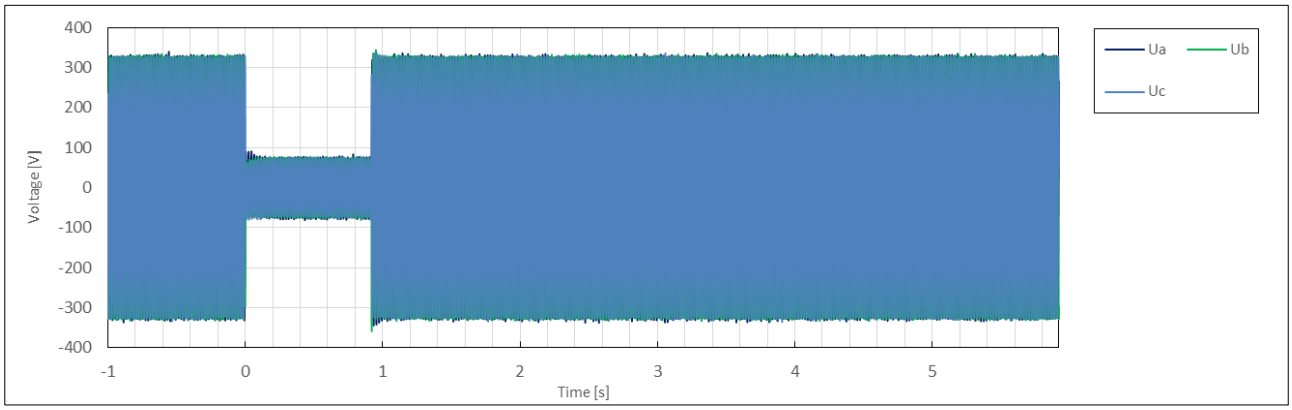

300
250
200
150
100
50
0
-50
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

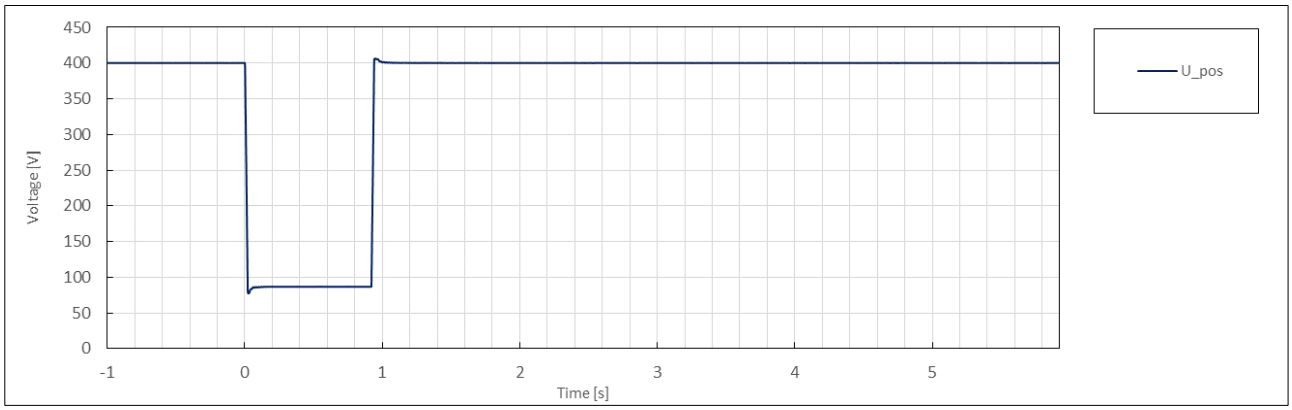

200
150
100
50
0
-50
-100
-150
-200
-250
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg

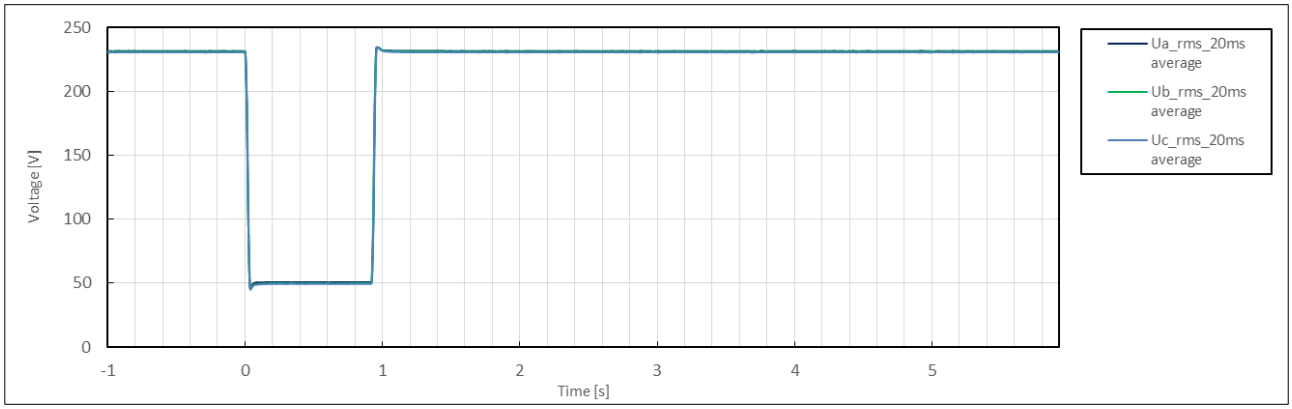

400
200
0
-200
-400
-600
-800
-1,000
-1,200
-1,400
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


120000
100000
80000
60000
40000
20000
0
-20000
-40000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

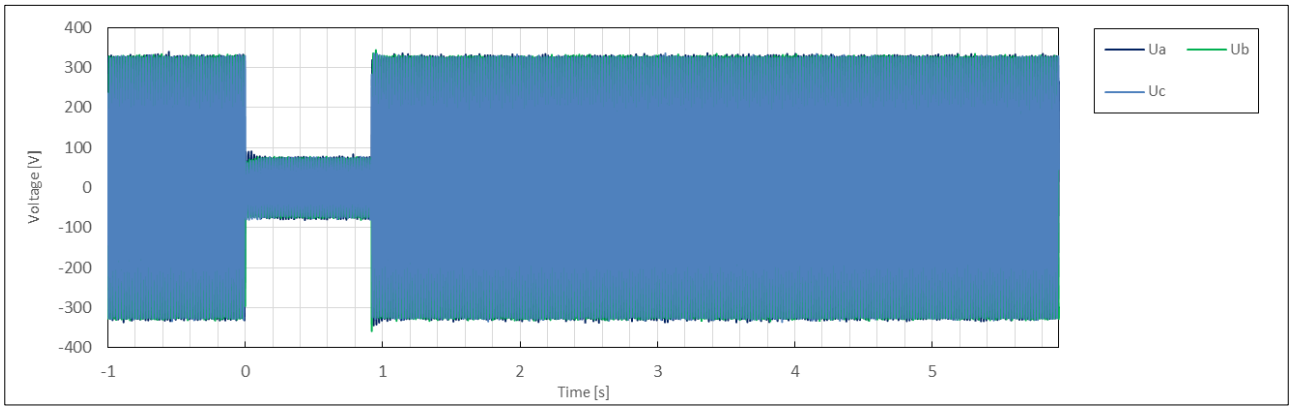
No. 2.1 Idle Test

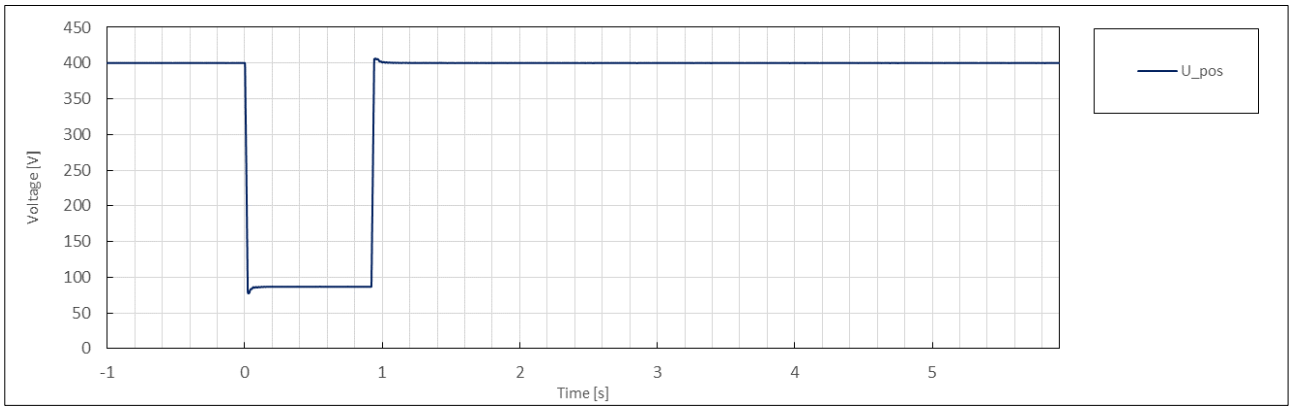


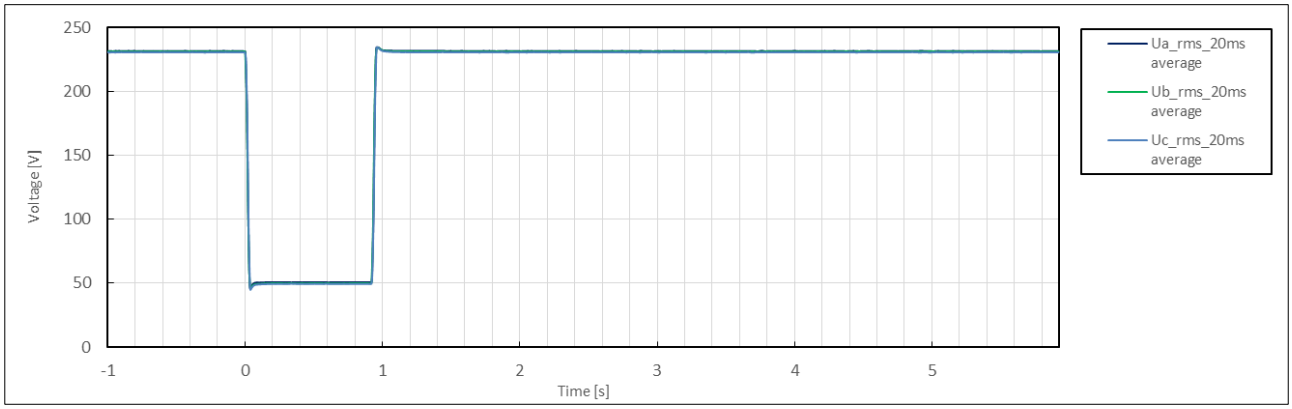


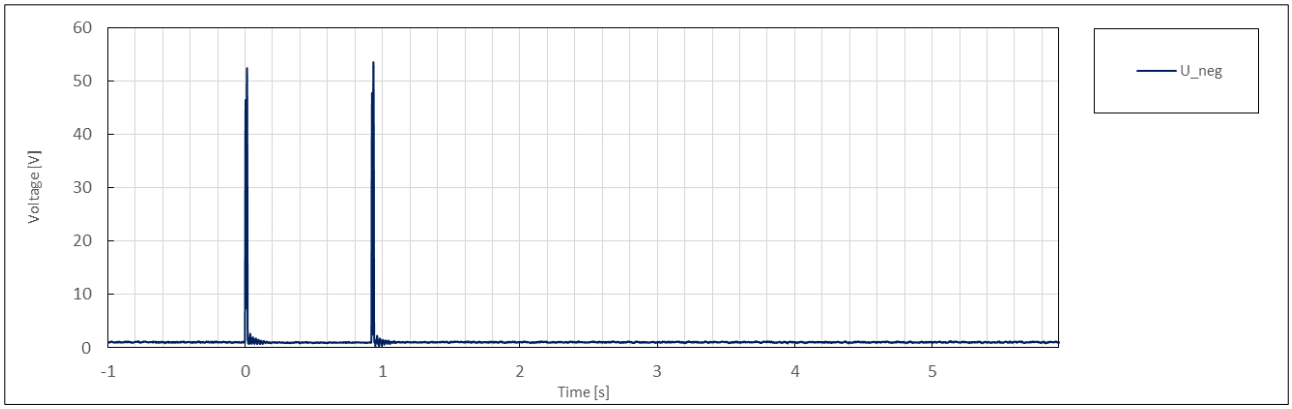


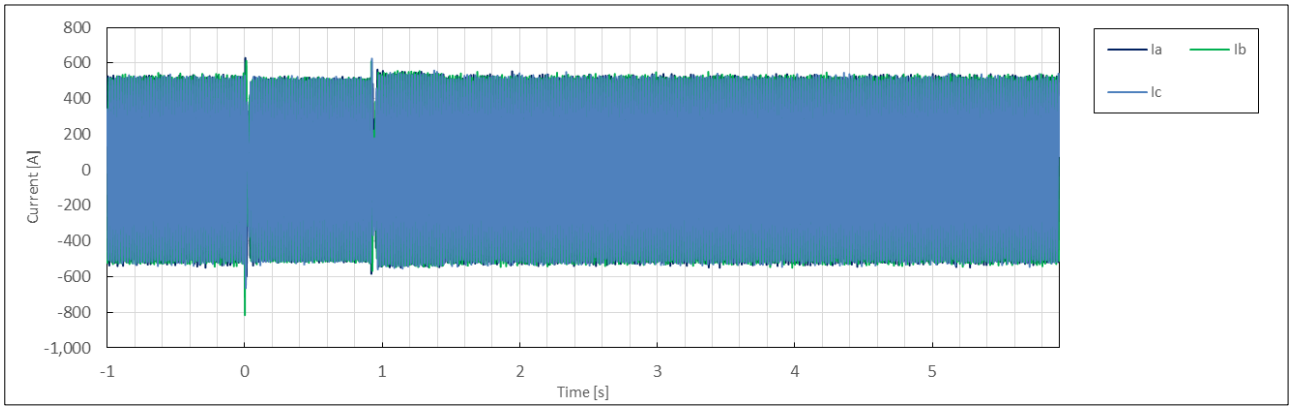
No. 2.1 Load Test

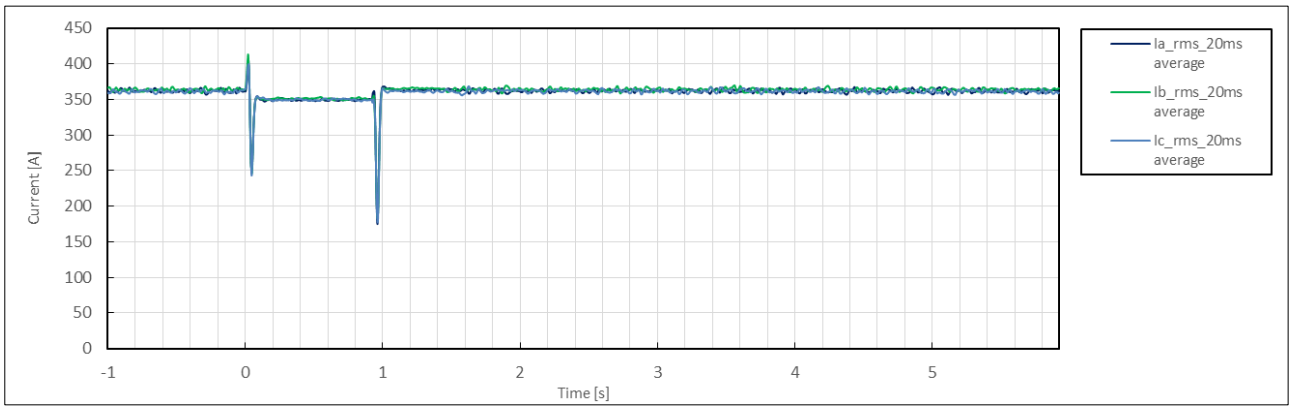


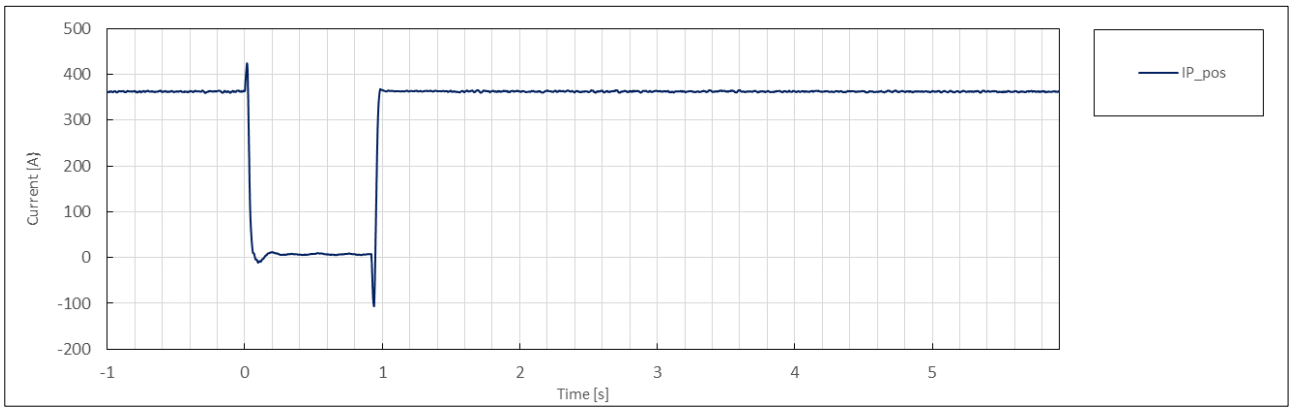


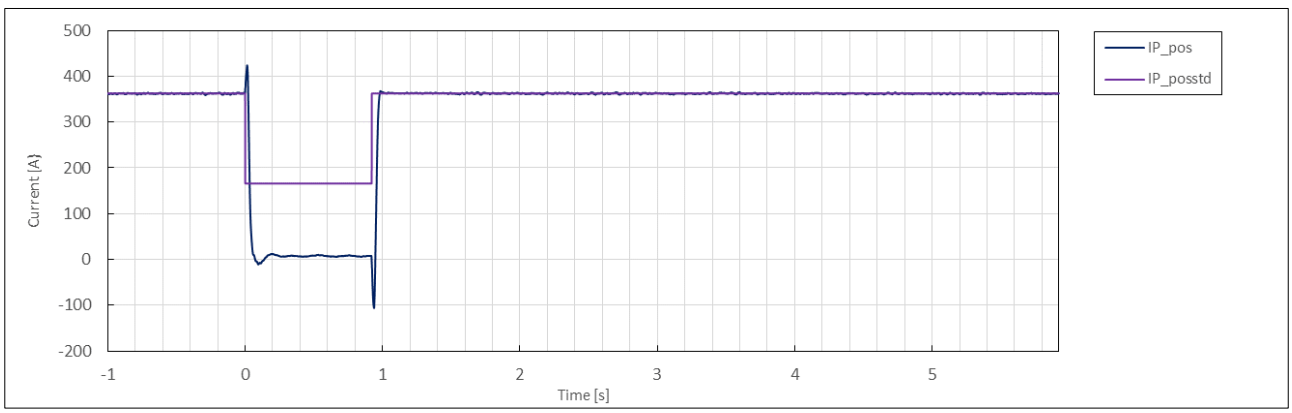


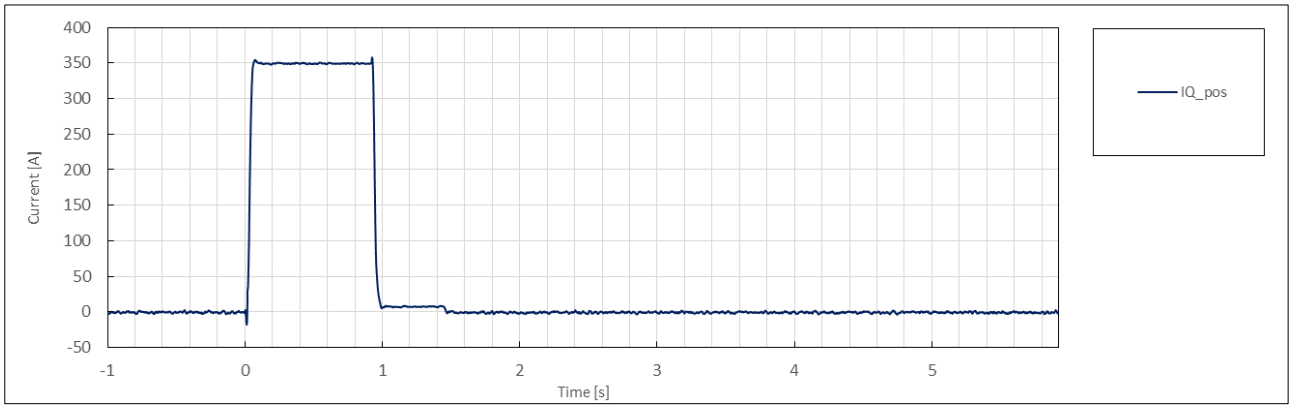


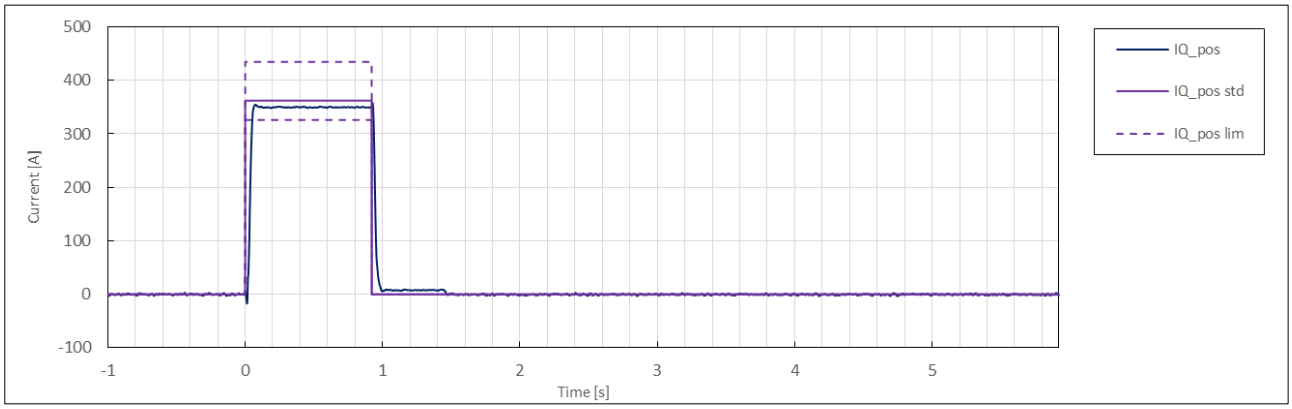

800
600
400
200
0
-200
-400
-600
-800
-1,000
Current [A]
-1
0
1
2
3
4
5
Time [s]
Ia
Ib
Ic

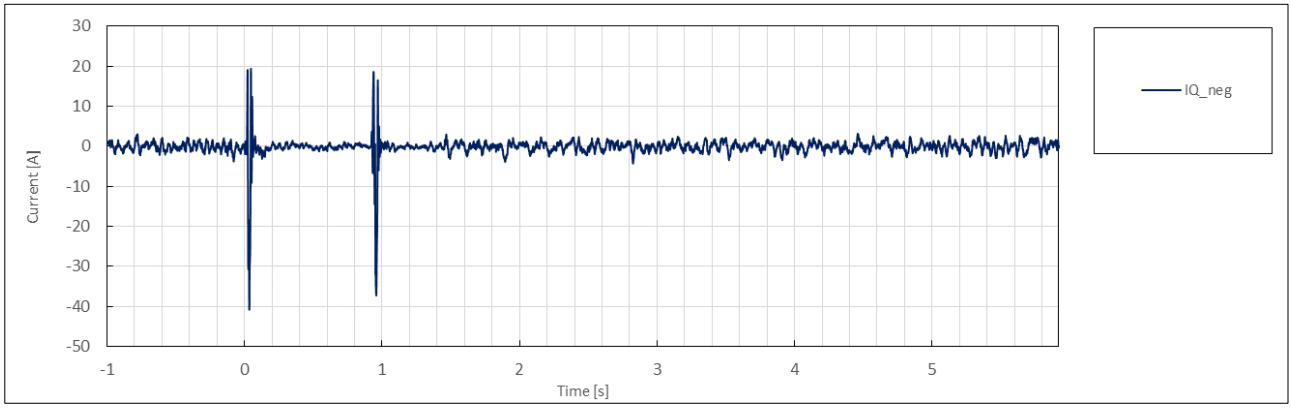

450
400
350
300
250
200
150
100
50
0
Current [A]
-1
0
1
2
3
4
5
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

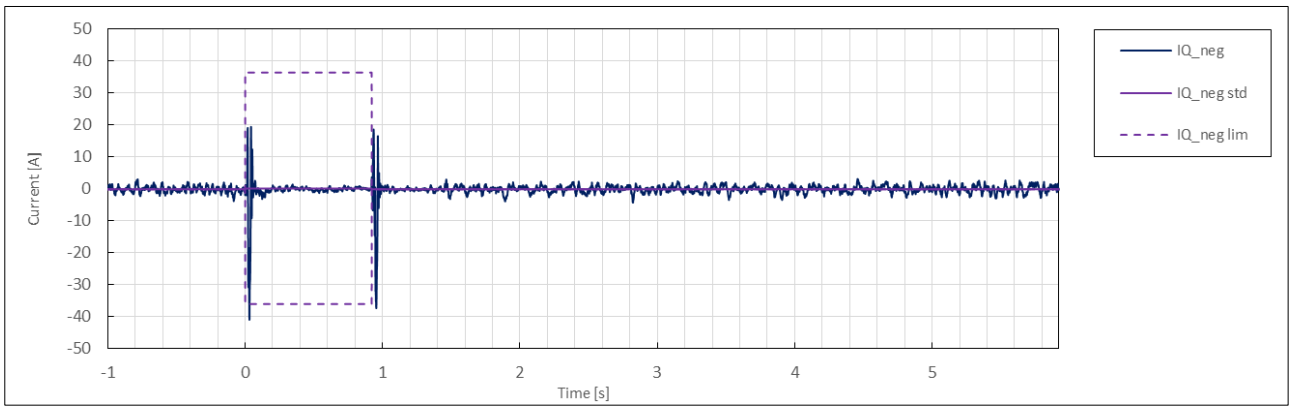

500
400
300
200
100
0
-100
-200
Current [A]
-1
0
1
2
3
4
5
Time [s]
IP_pos

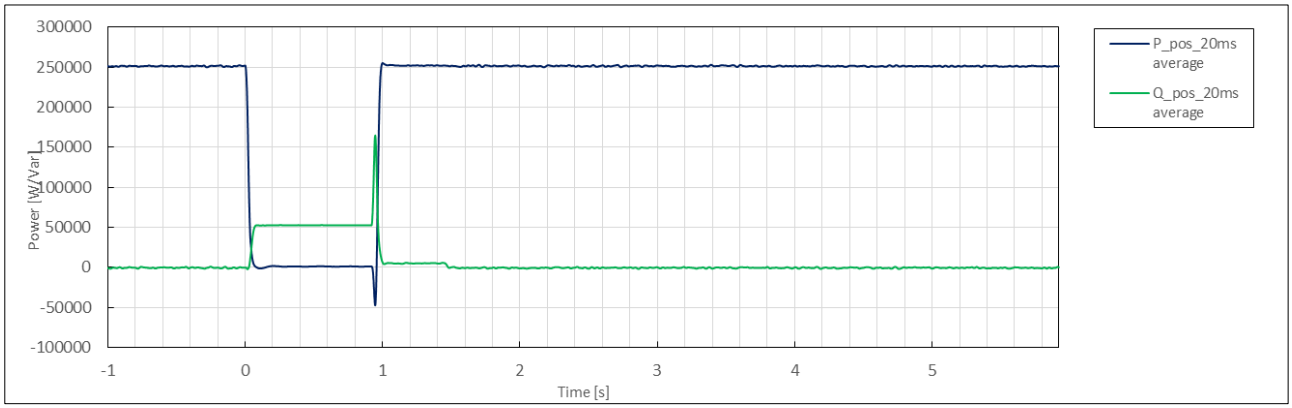

500
400
300
200
100
0
-100
-200
Current [A]
-1
0
1
2
3
4
5
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

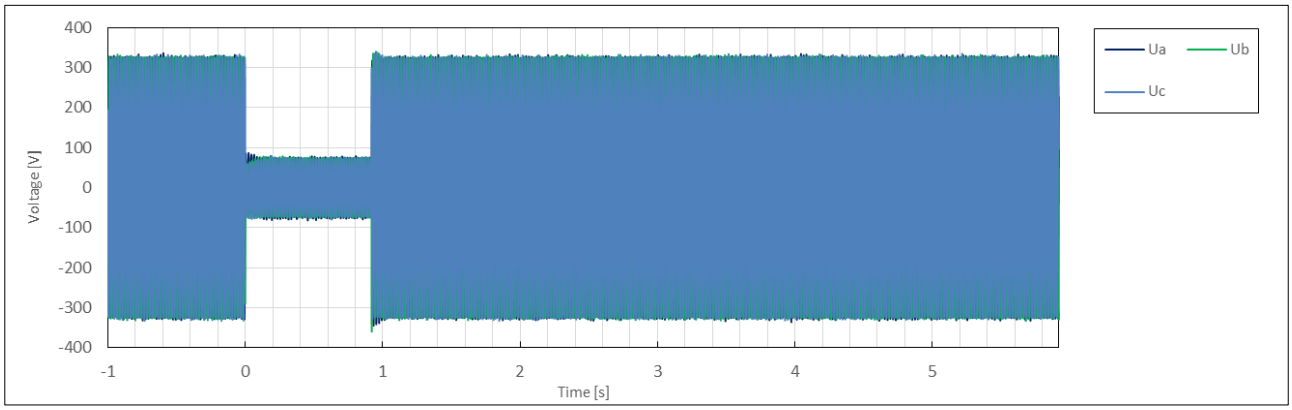

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

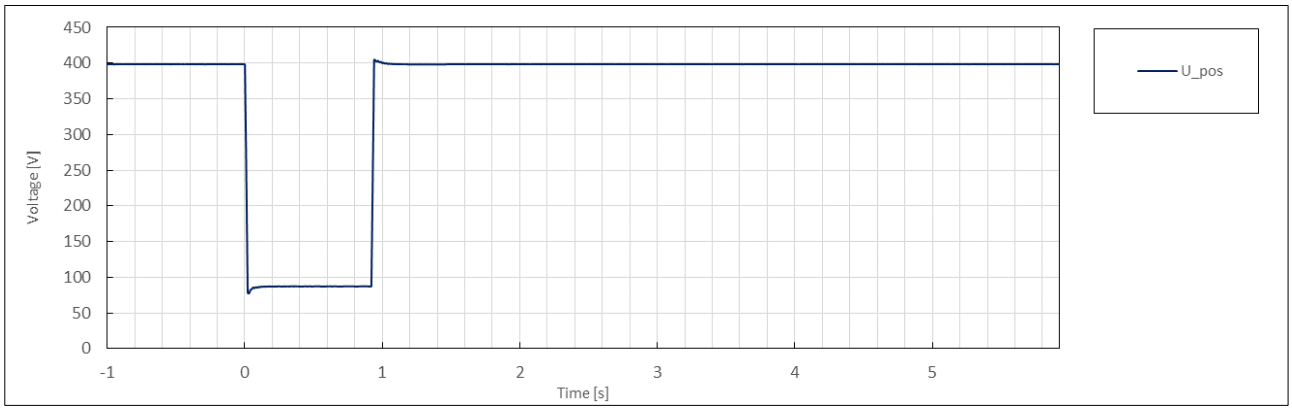

Current [A]
Time [s]
IQ_neg

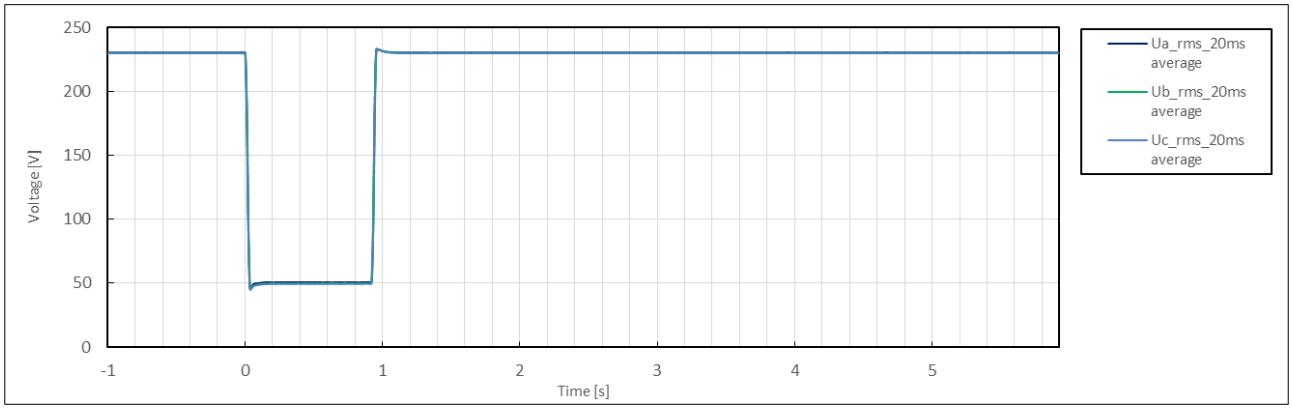

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

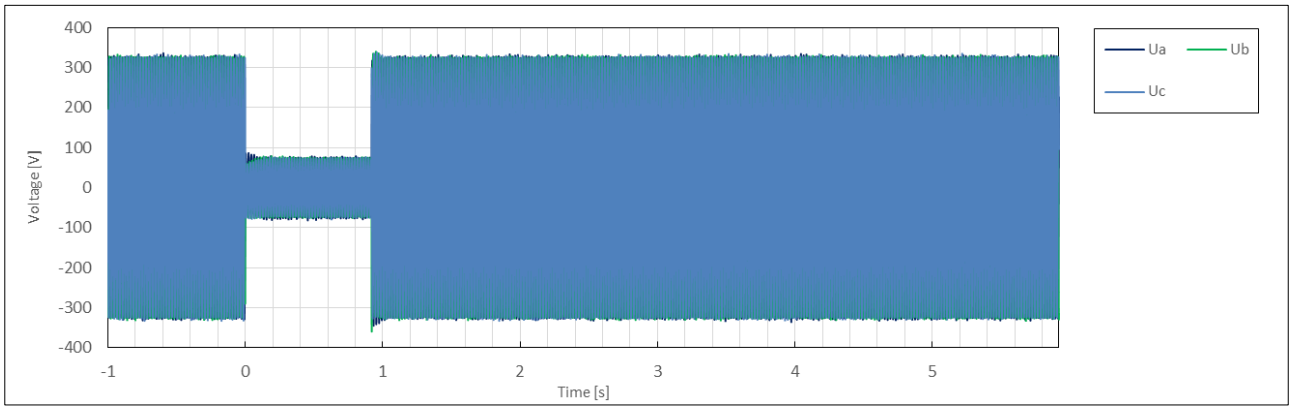
No.2.2 Idle Test

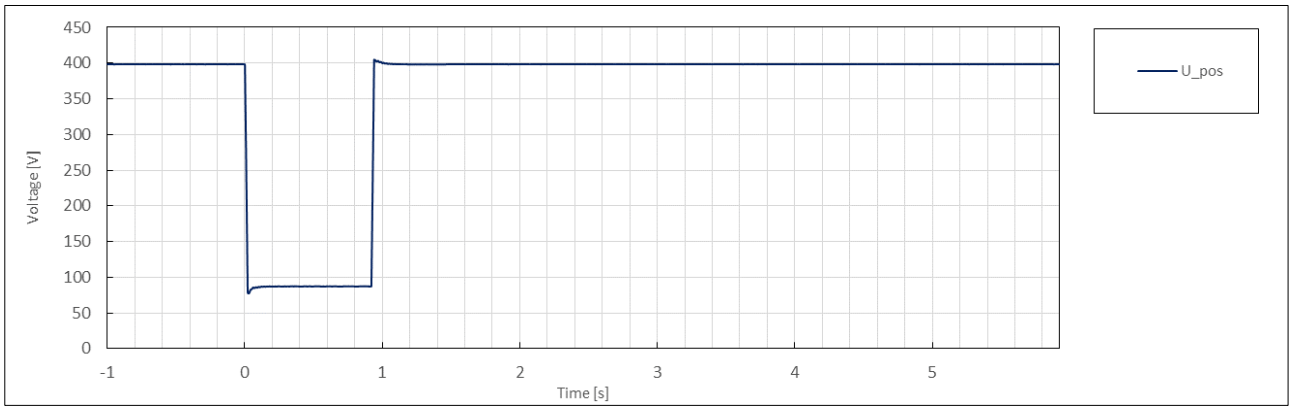


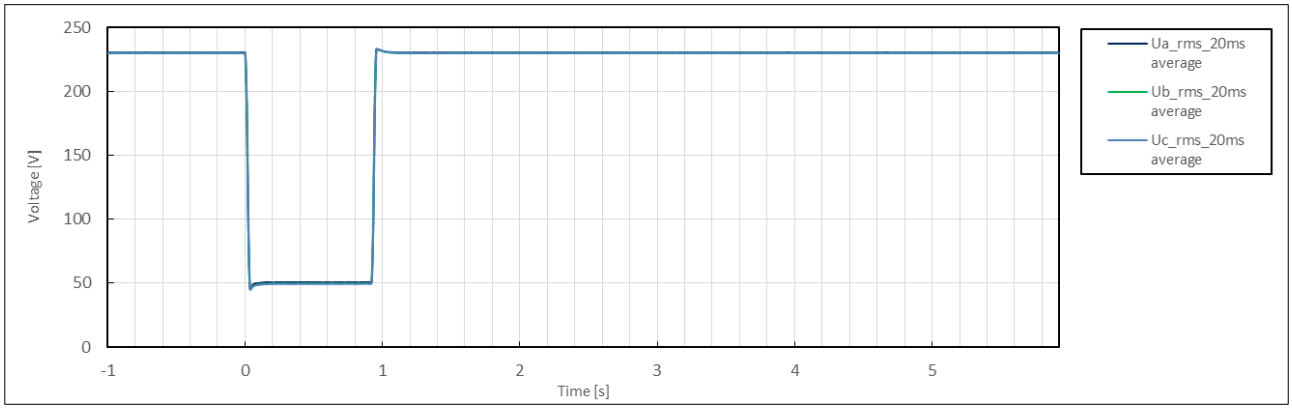


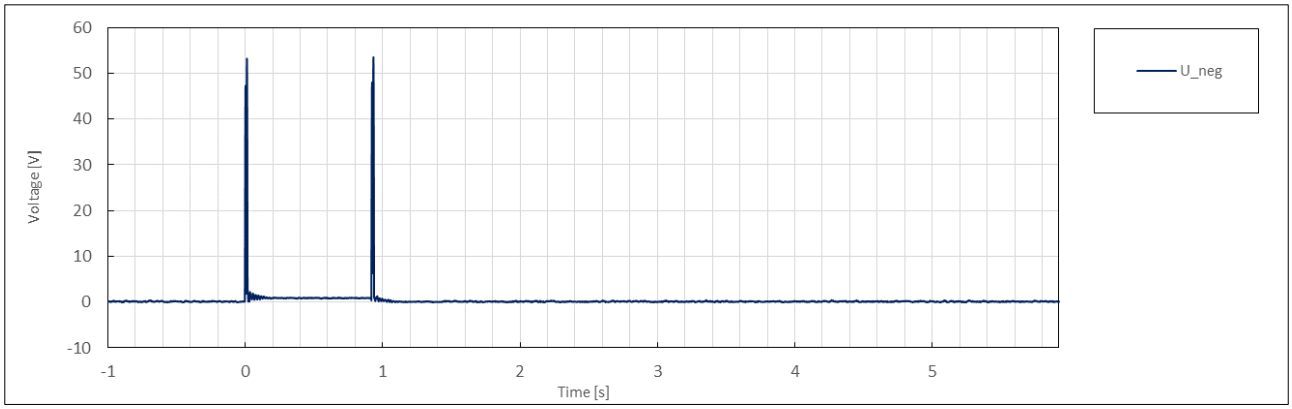


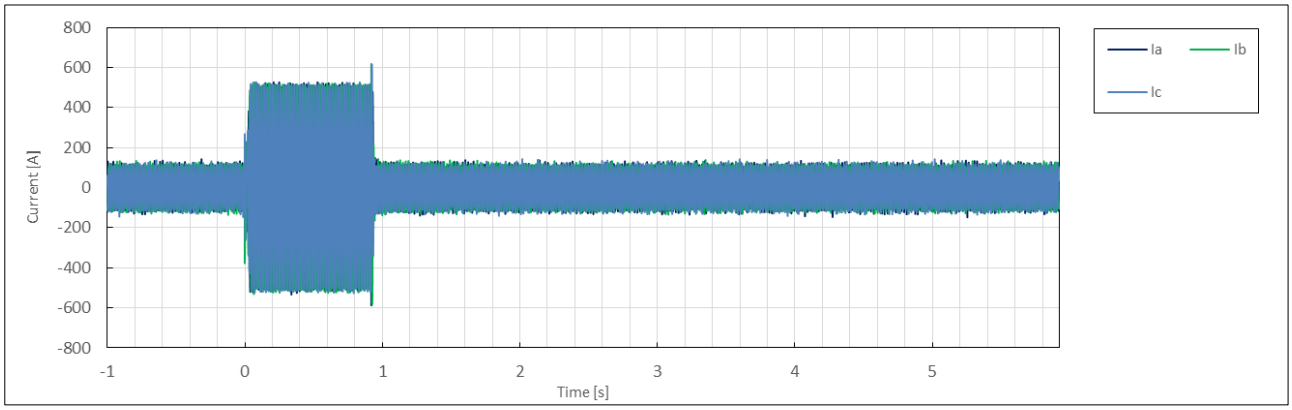
No. 2.2 Load Test

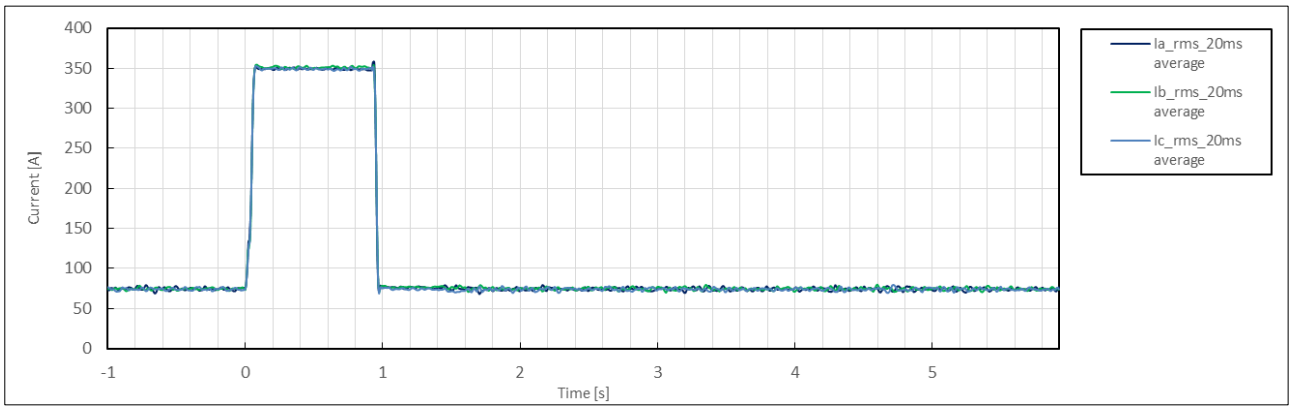


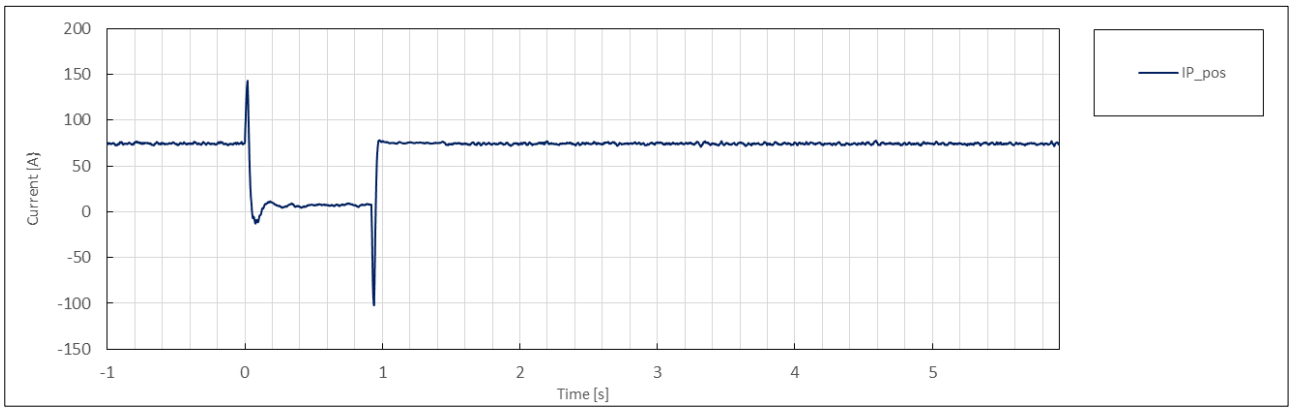


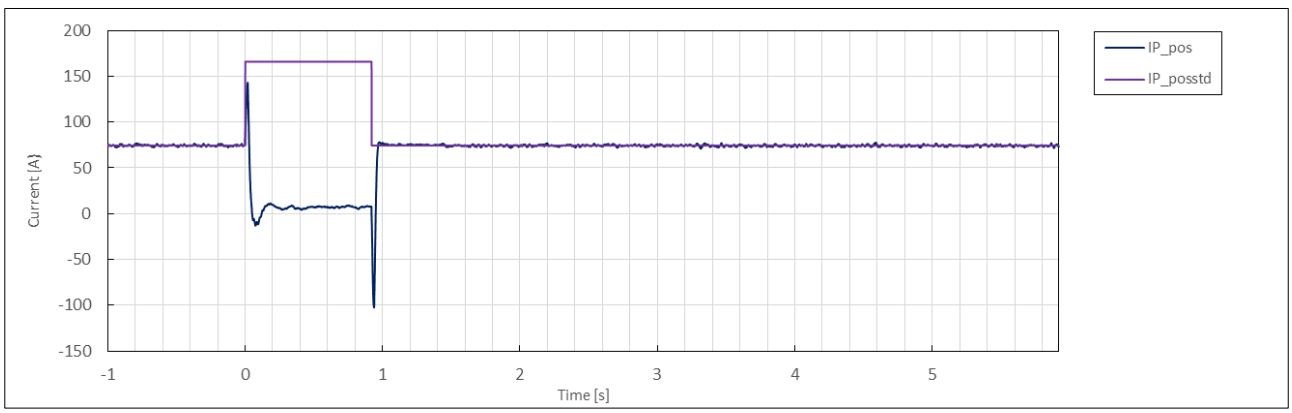


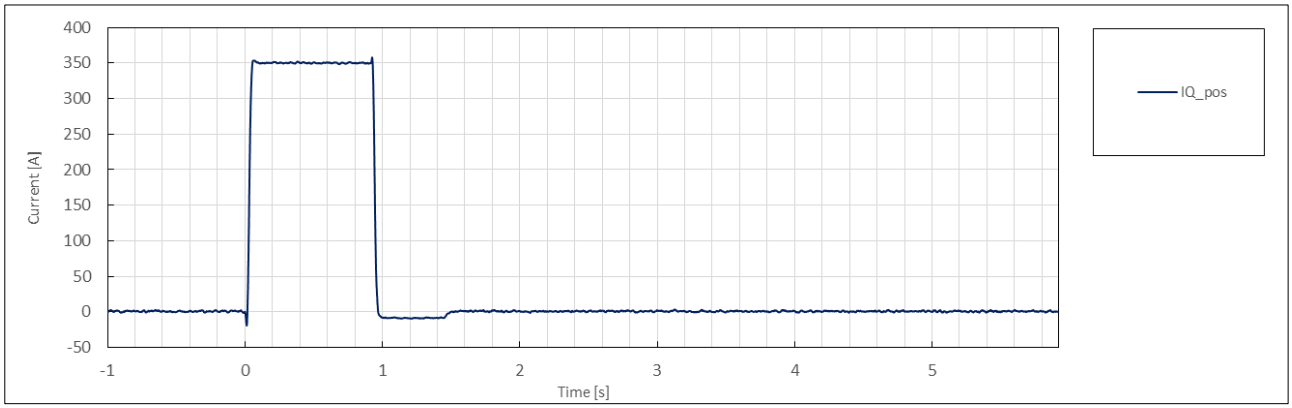


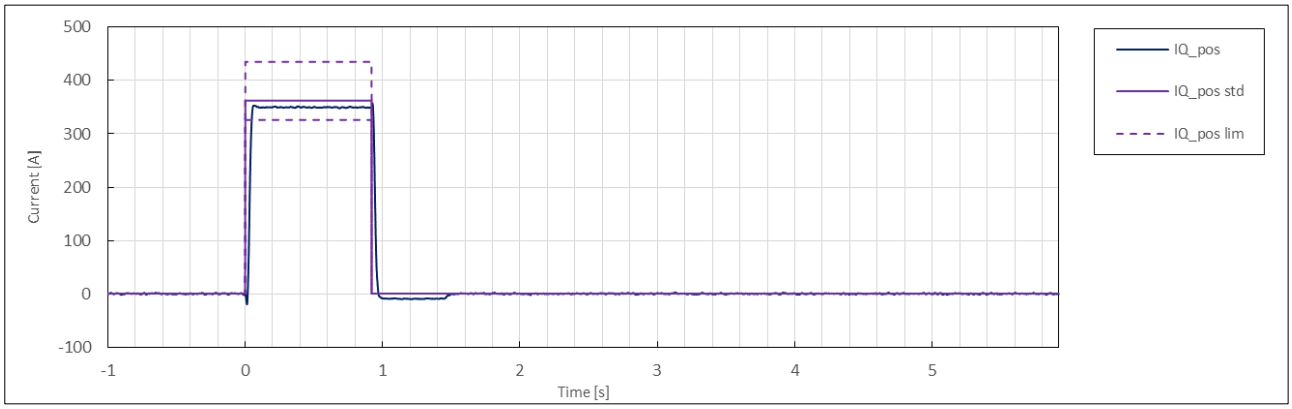

Current [A]
Time [s]
Ia
Ib
Ic

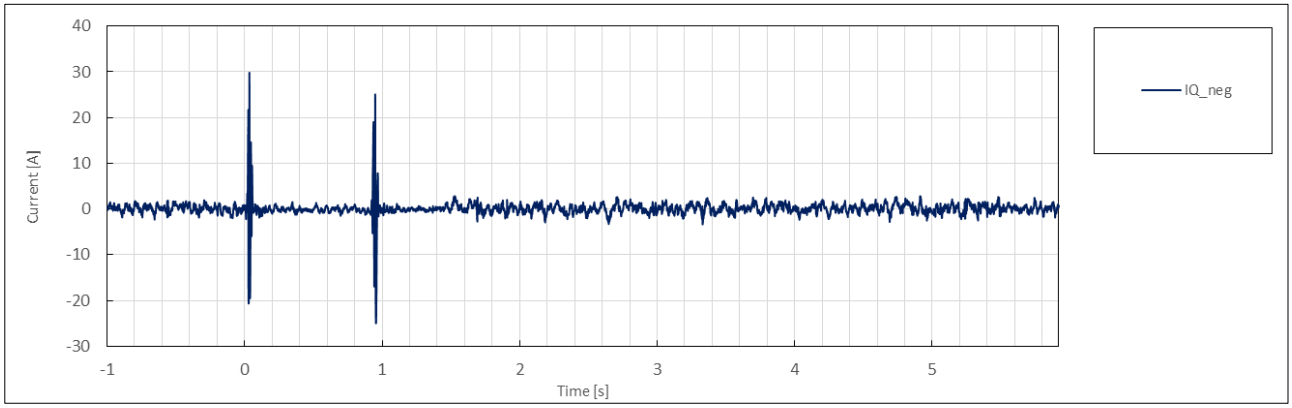

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

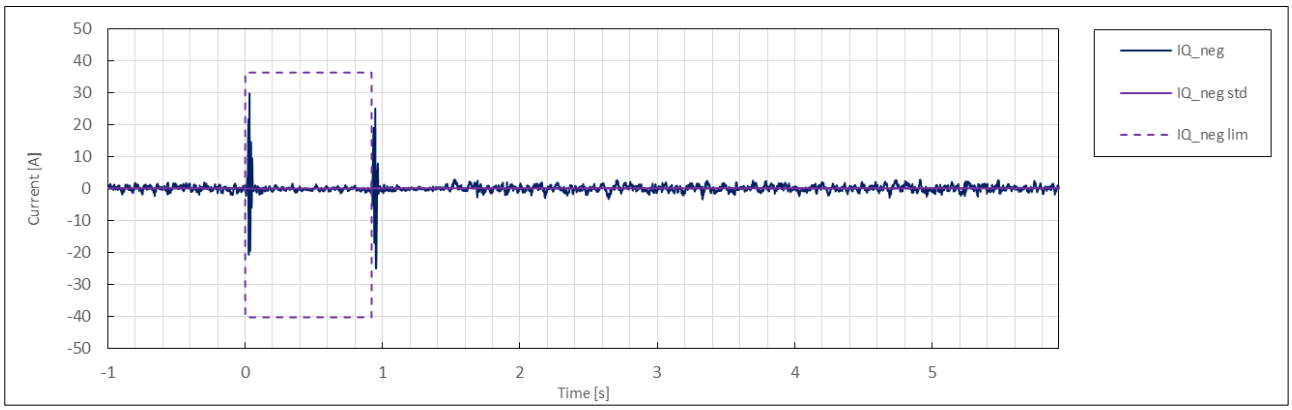

Current [A]
Time [s]
IP_pos

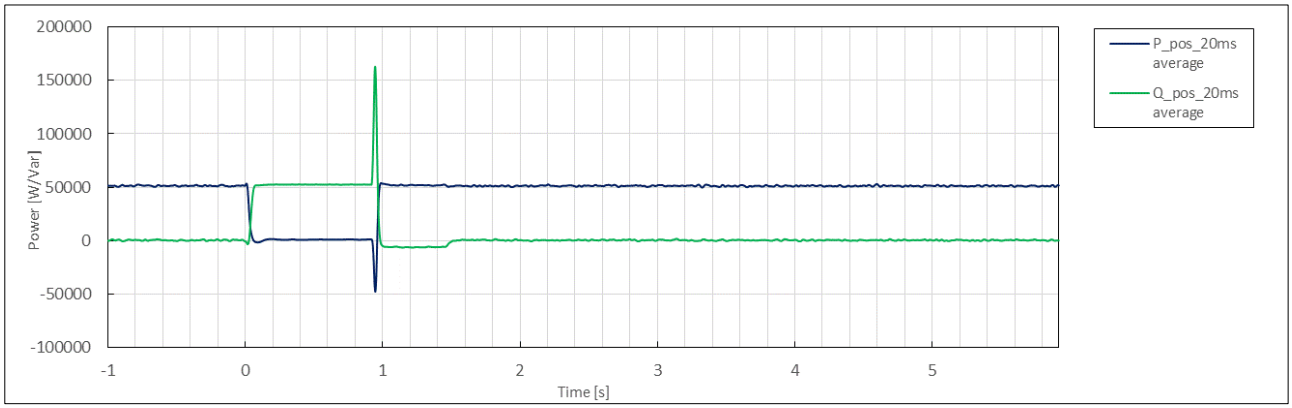

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

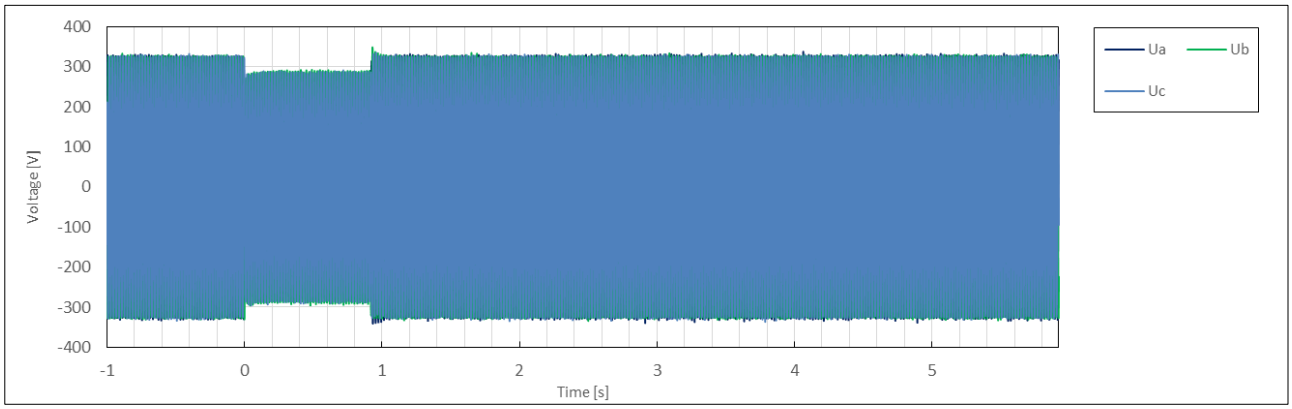

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

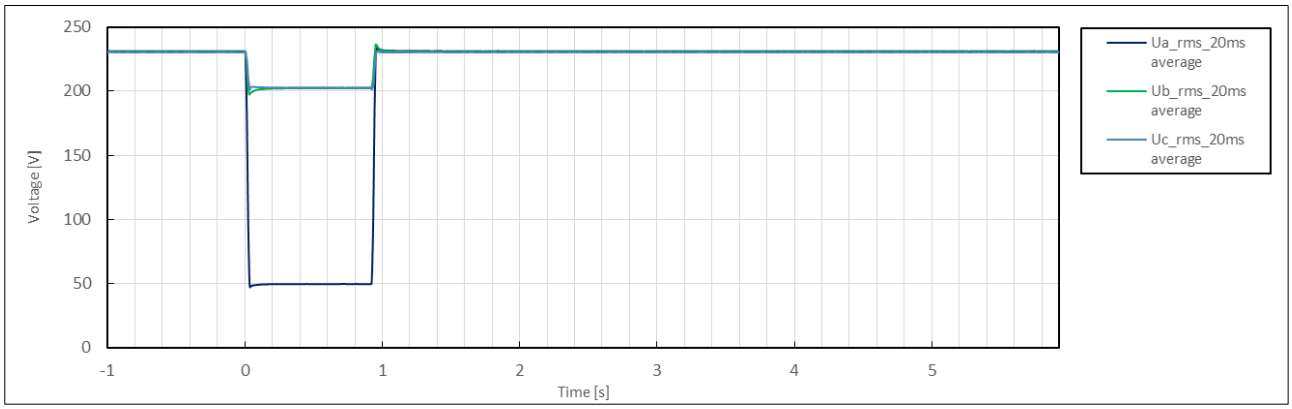

Current [A]
Time [s]
IQ_neg

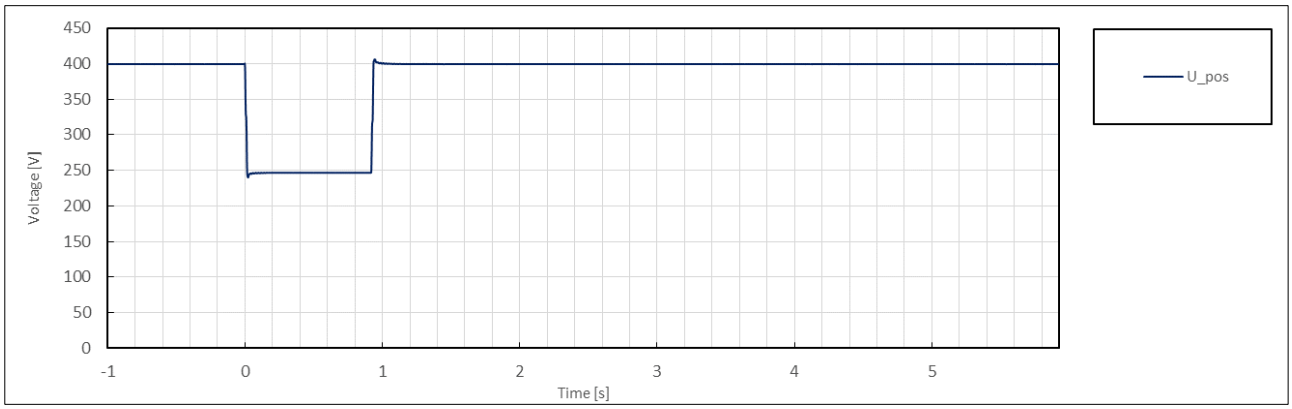

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


200000
150000
100000
50000
0
-50000
-100000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

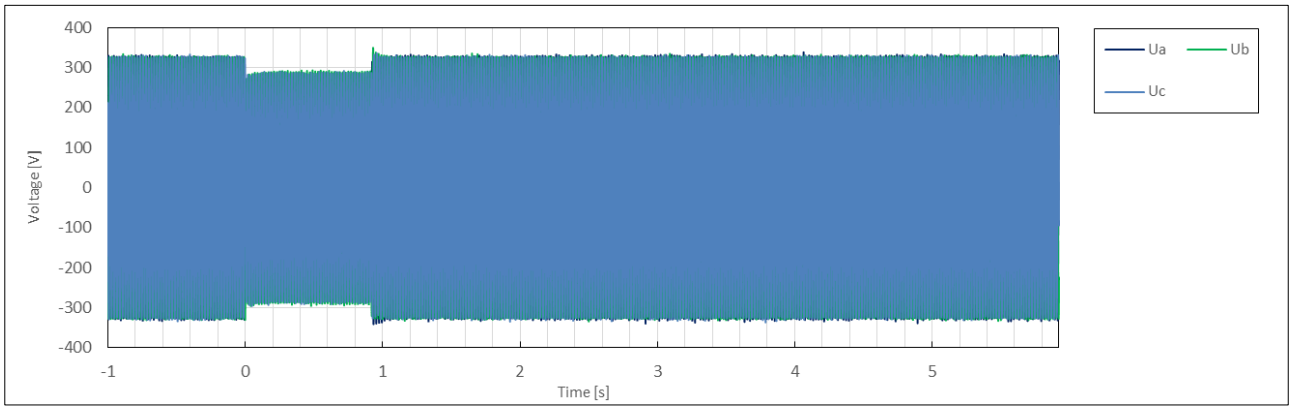
No. 2.3 Idle Test

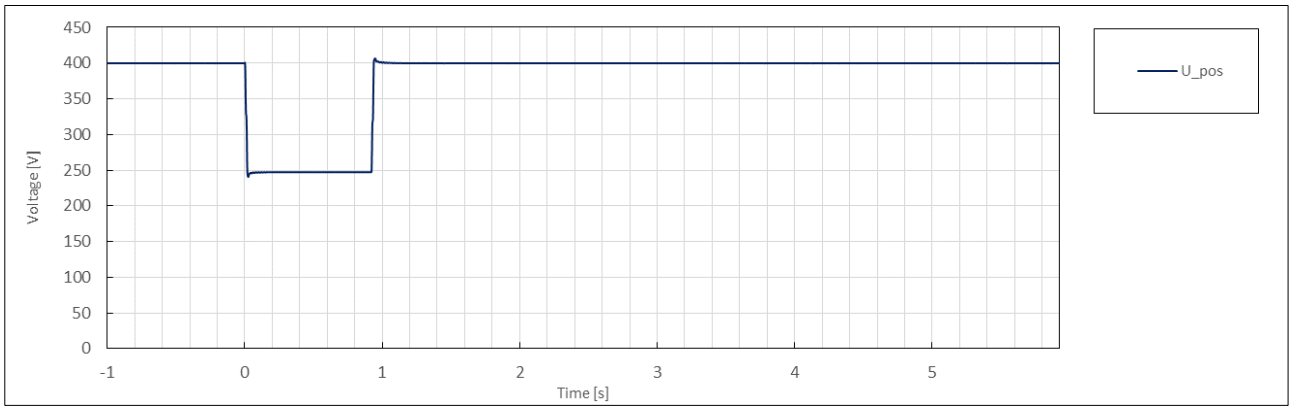


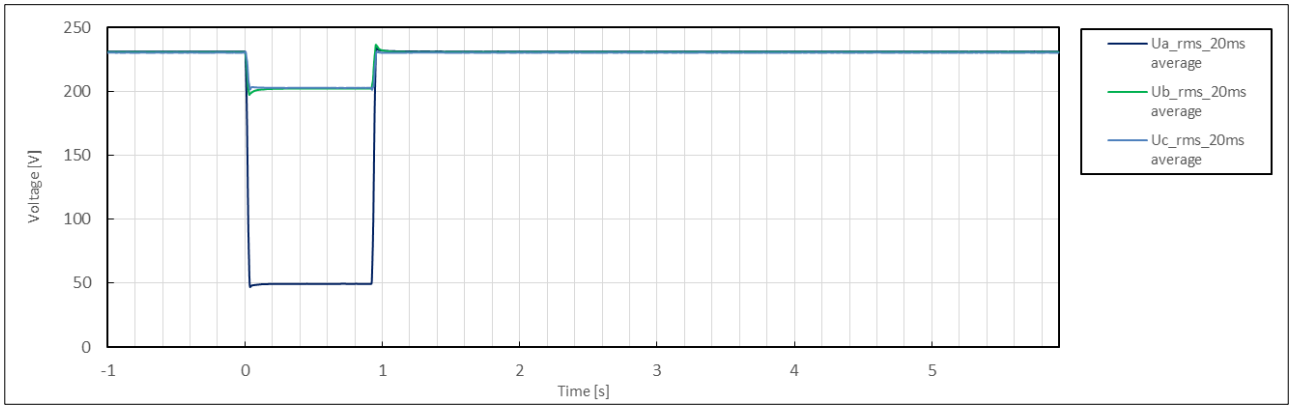


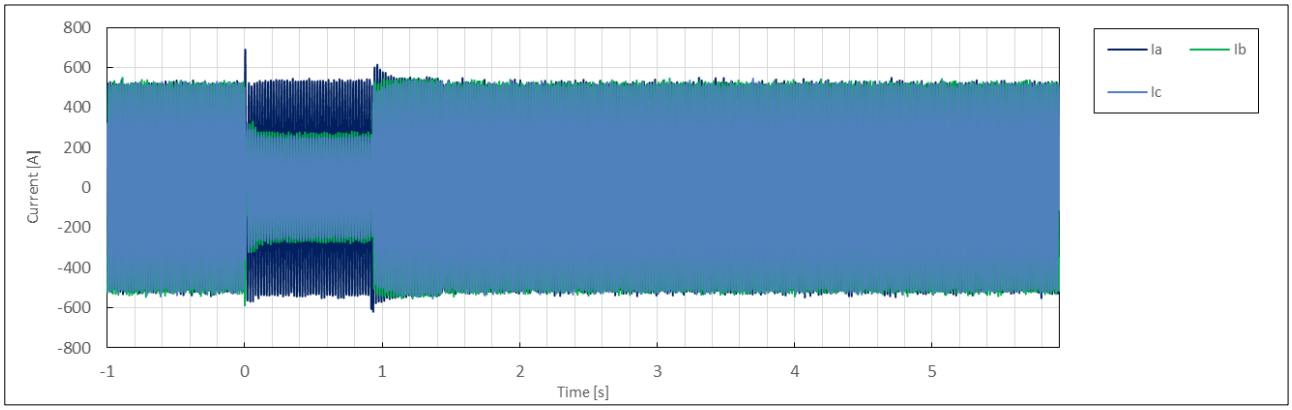


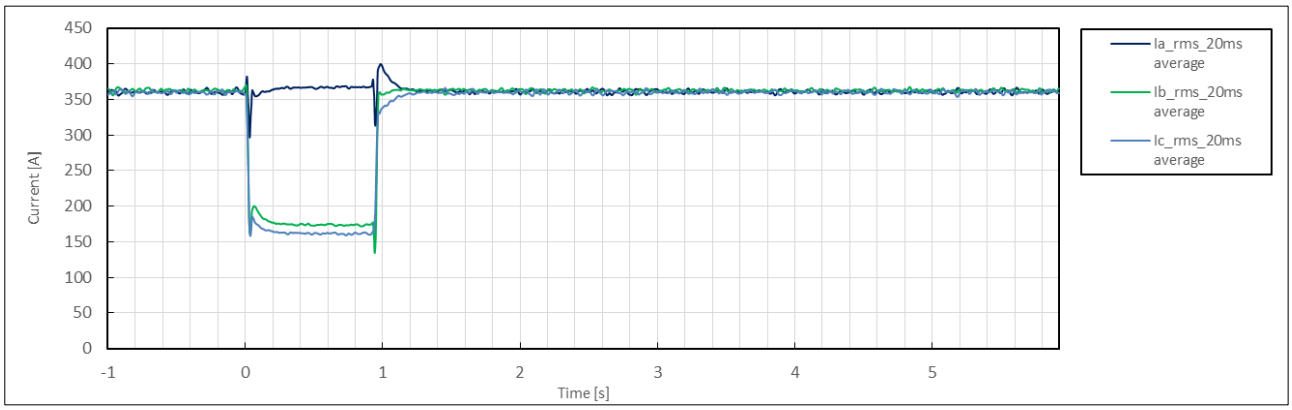
No. 2.3 Load Test

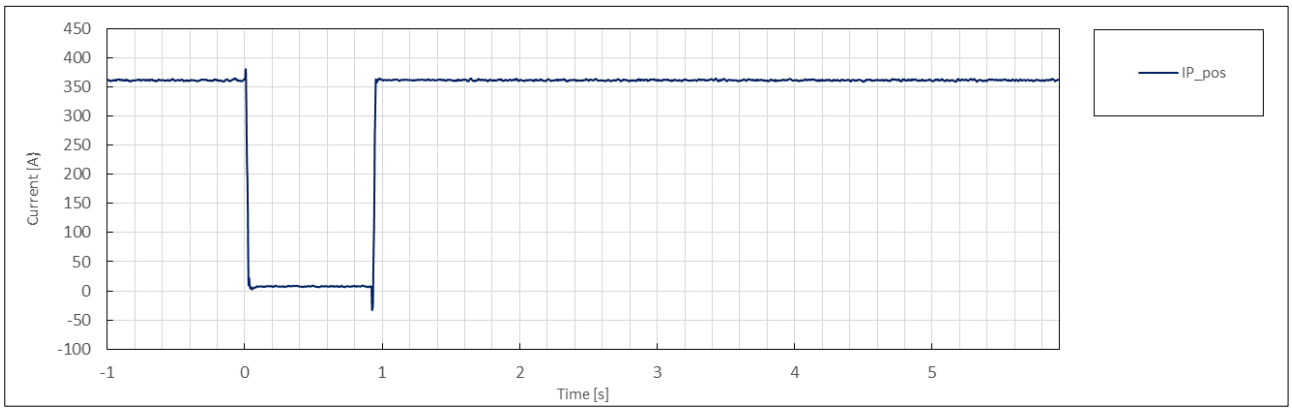


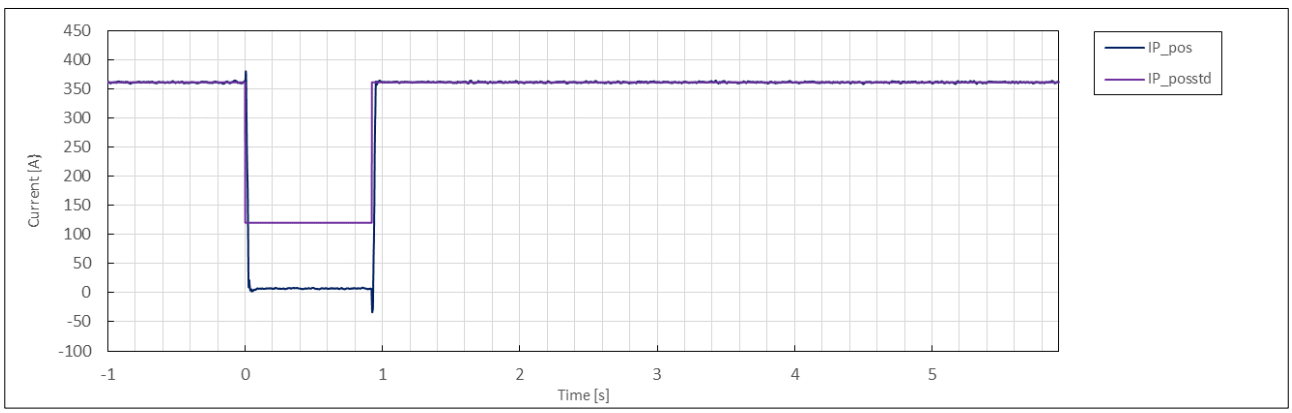


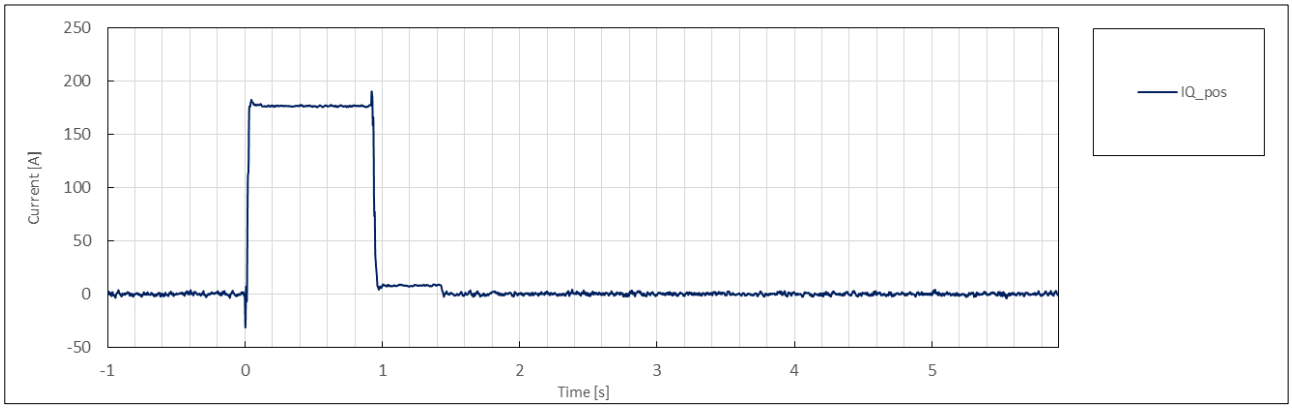


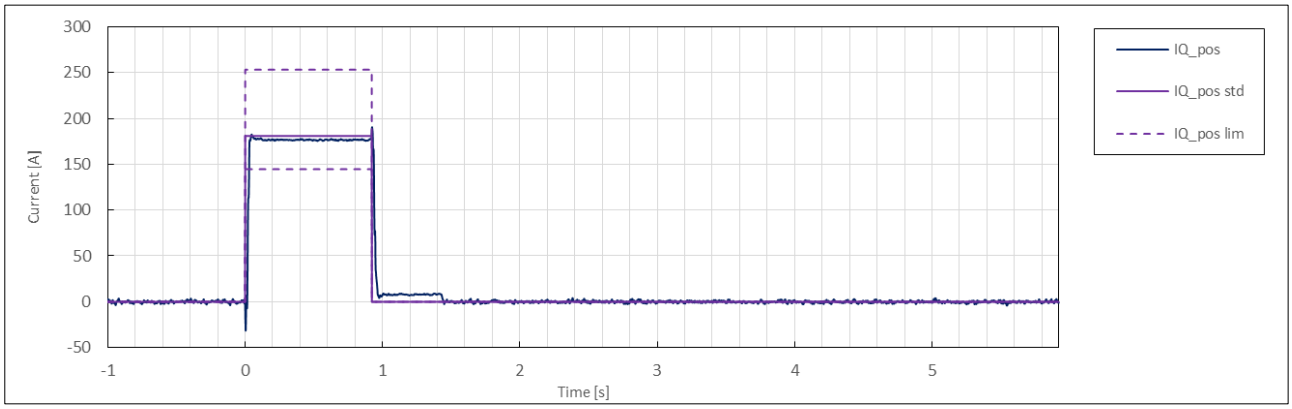

Current [A]
Time [s]
Ia
Ib
Ic

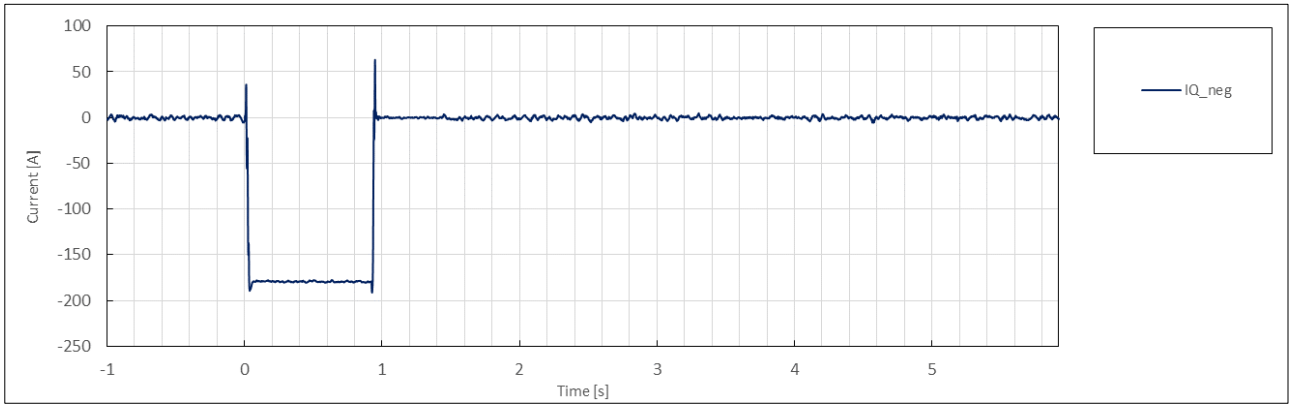

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

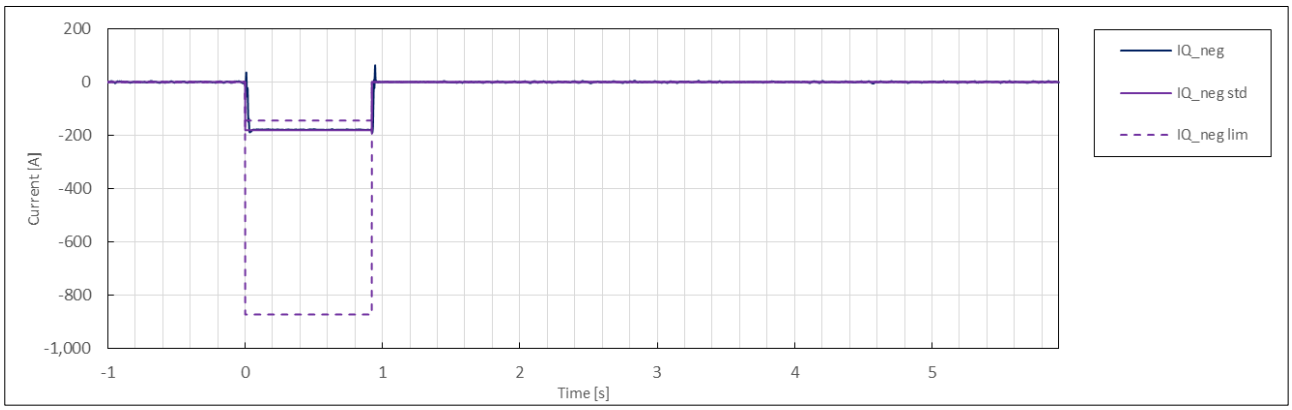

Current [A]
Time [s]
IP_pos

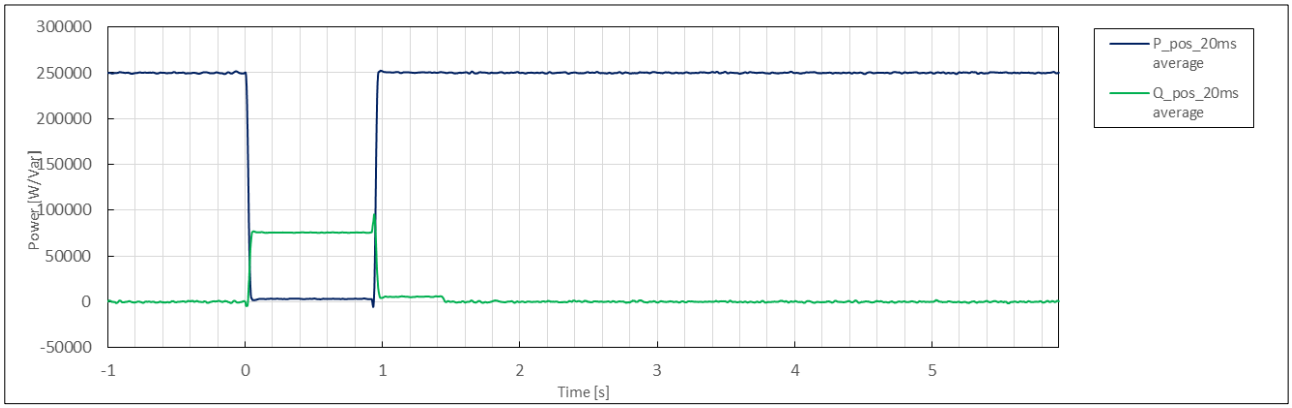

Current [A]
Time [s]
IP_pos
IP_posstd


250
200
150
100
50
0
-50
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos

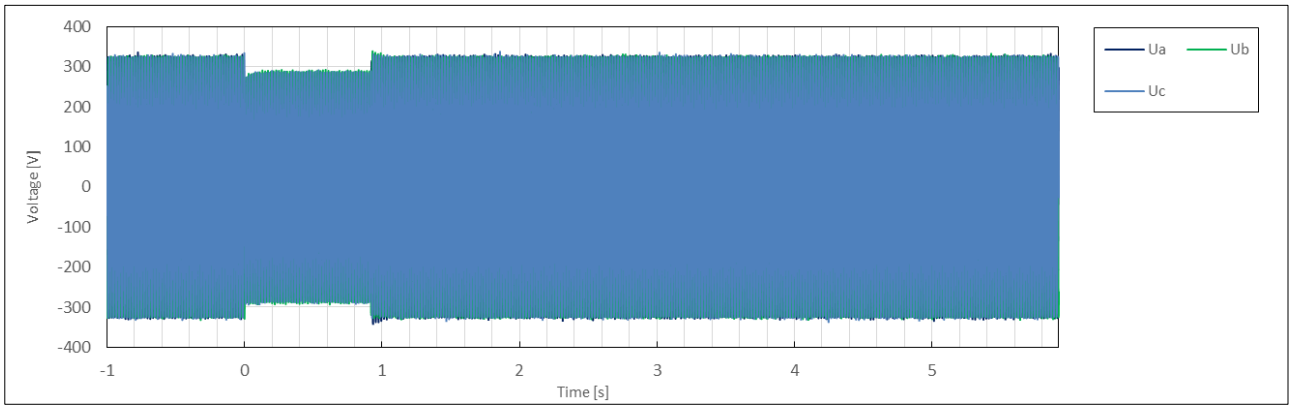

300
250
200
150
100
50
0
-50
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

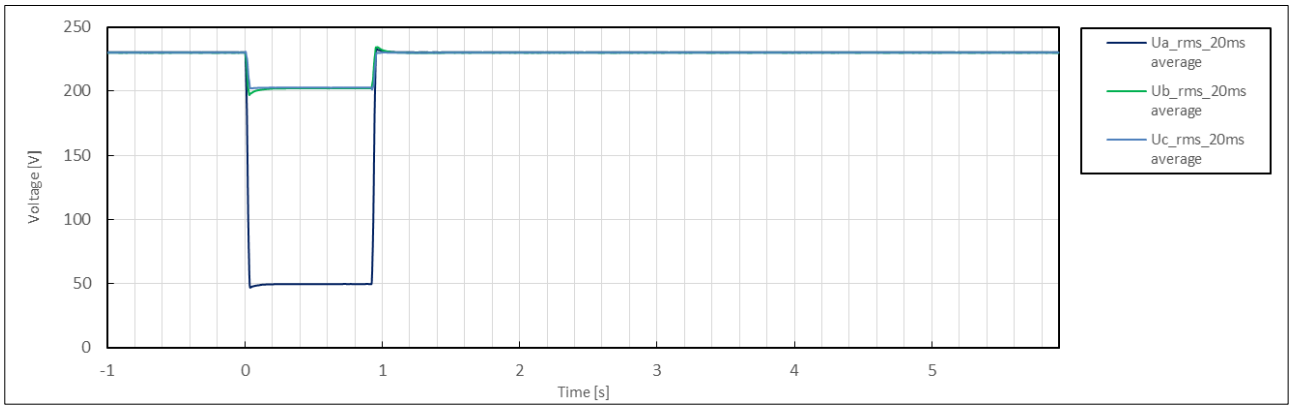

100
50
0
-50
-100
-150
-200
-250
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg

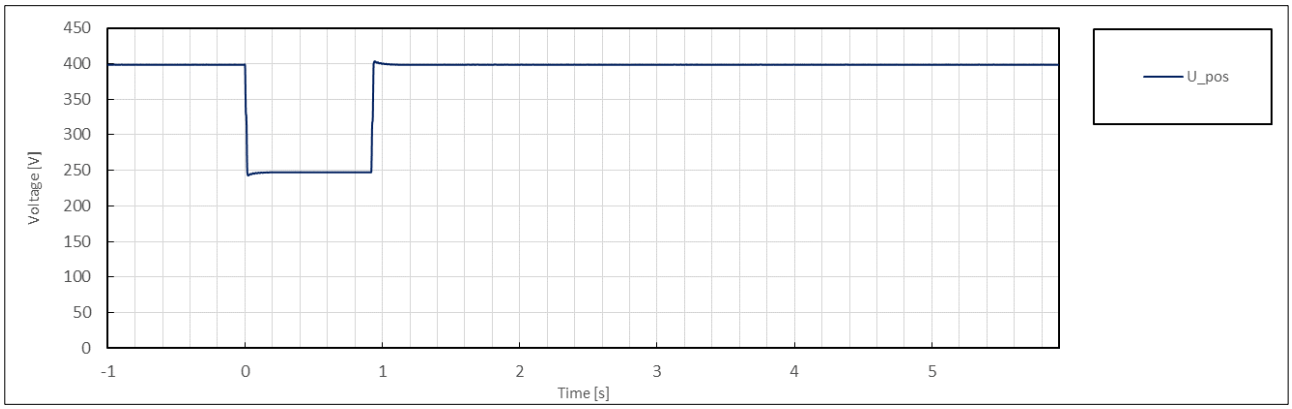

200
0
-200
-400
-600
-800
-1,000
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

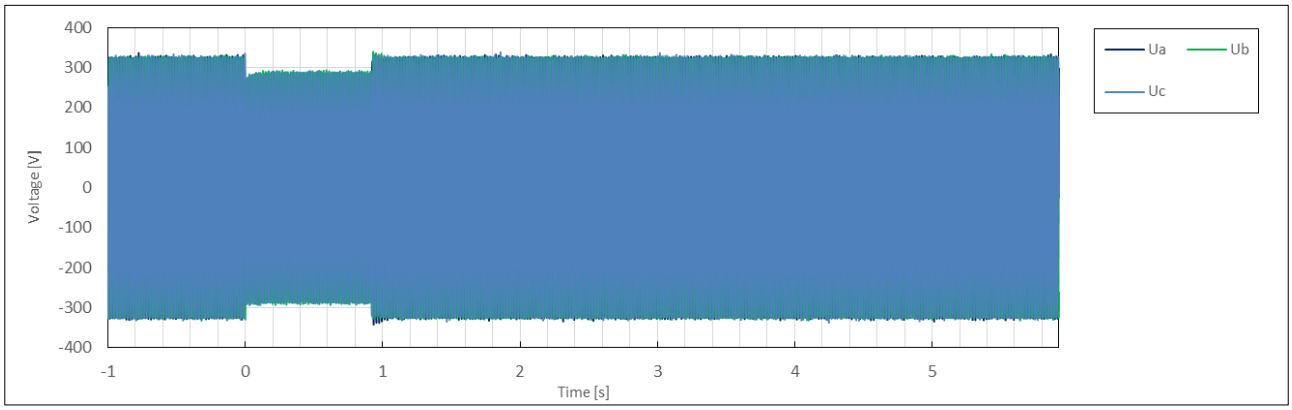
No. 2.4 Idle Test

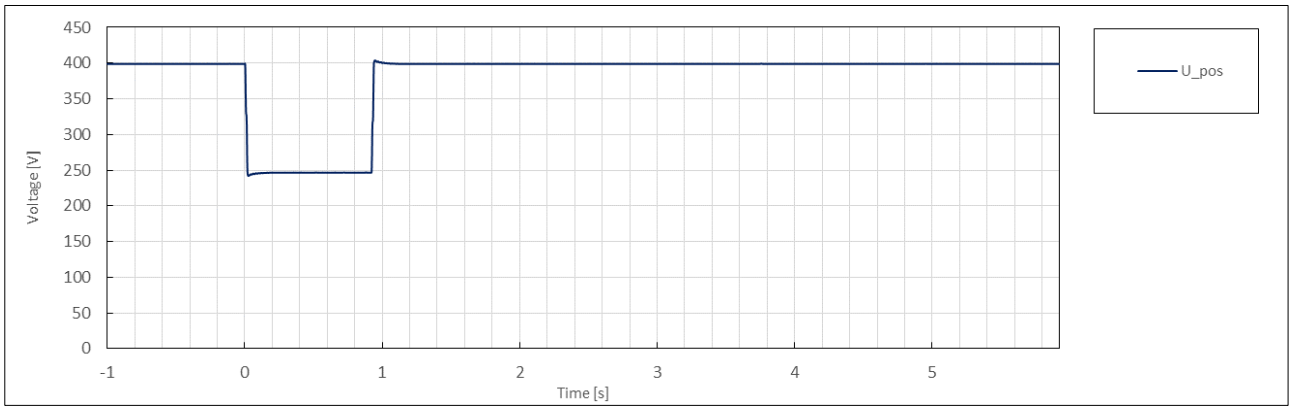


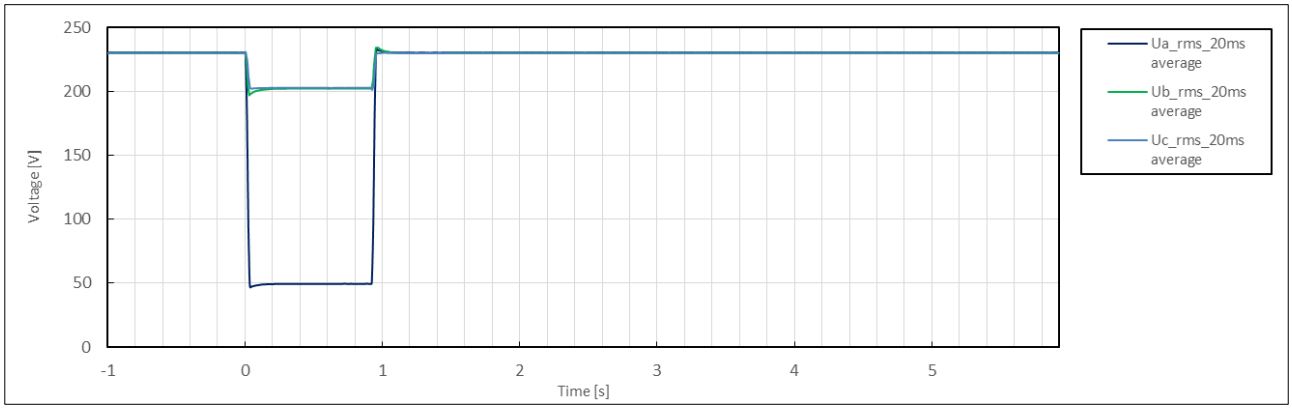


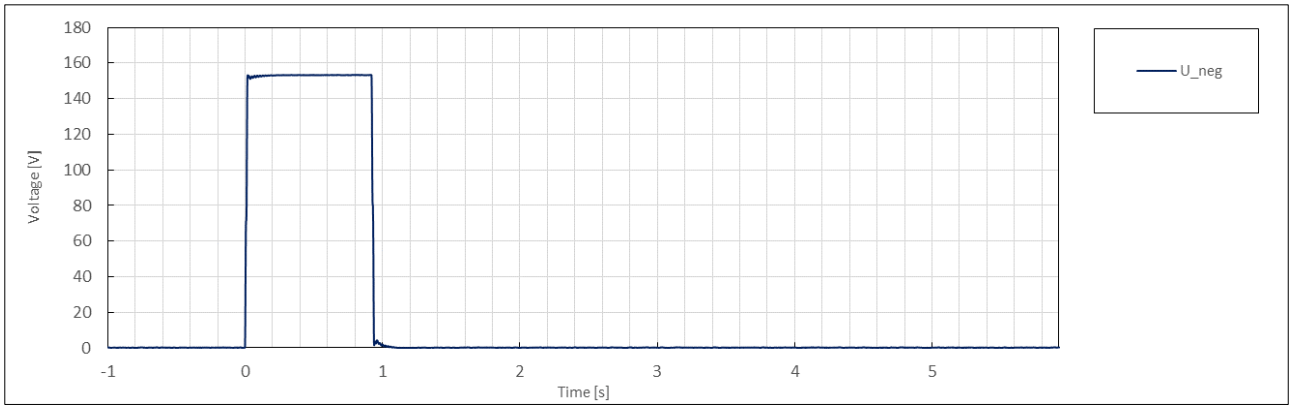


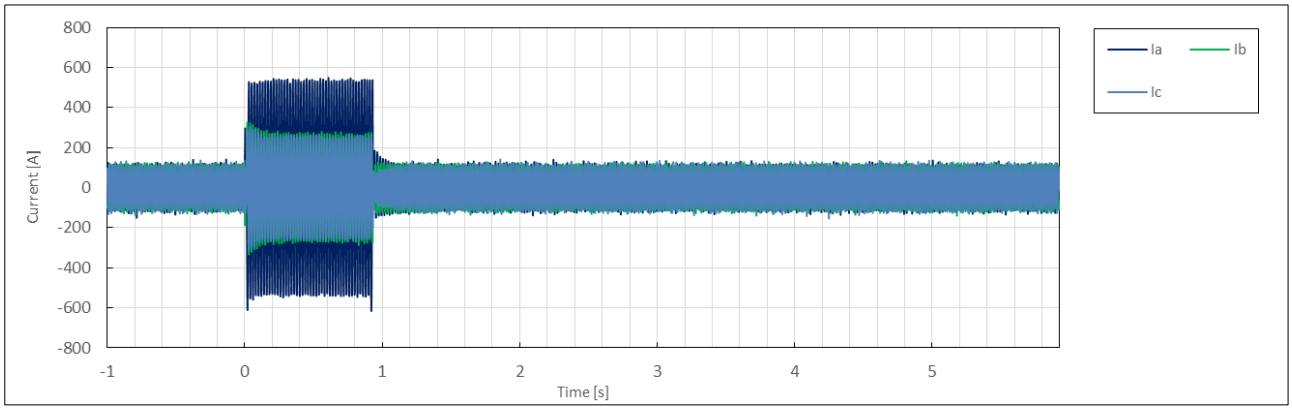
No. 2.4 Load Test

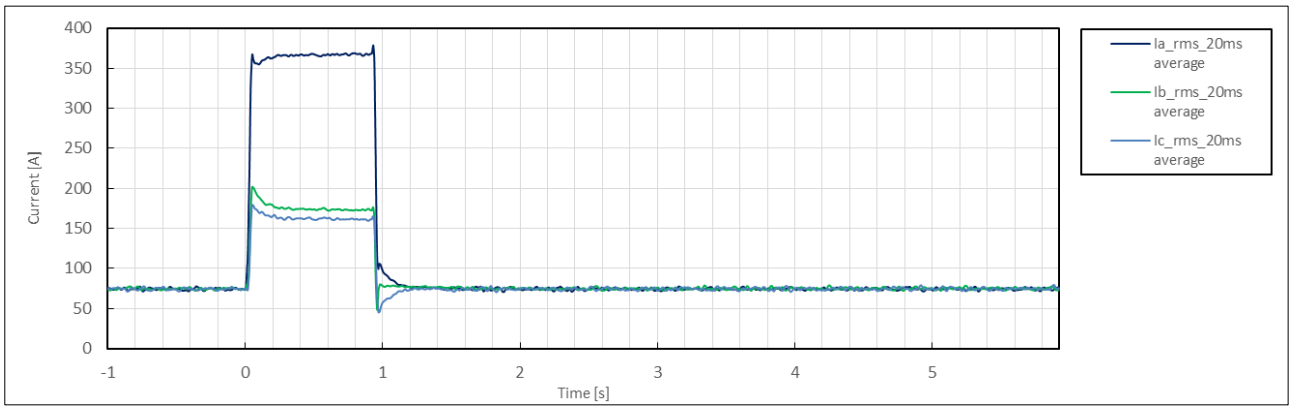


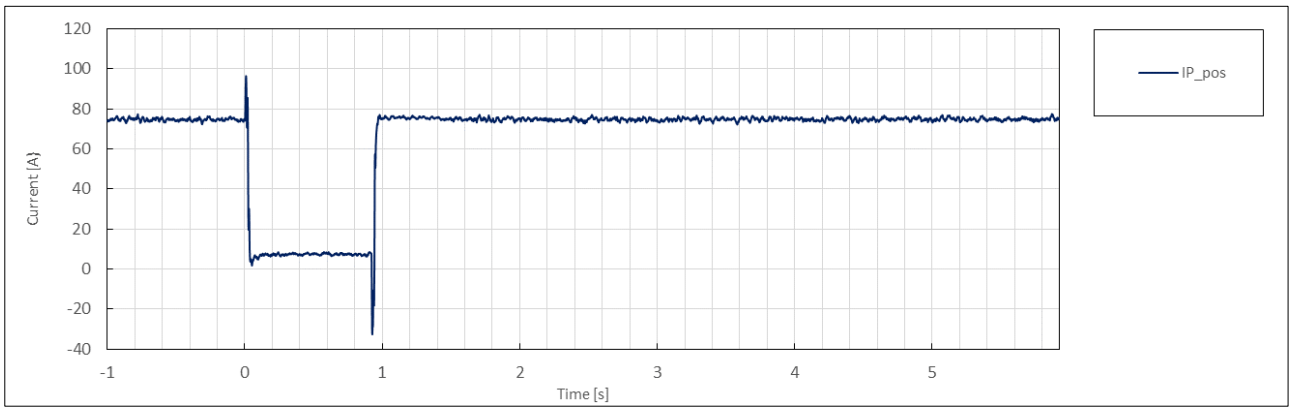


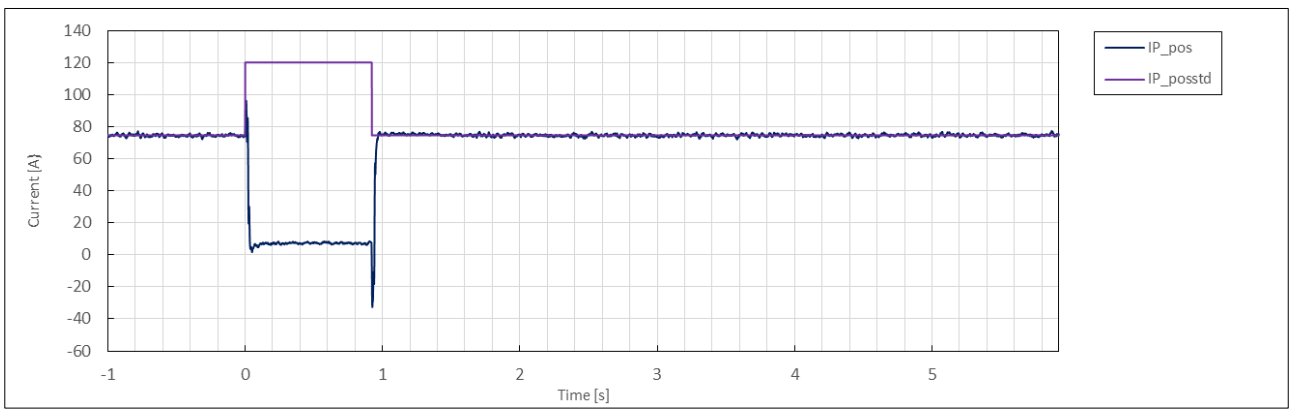


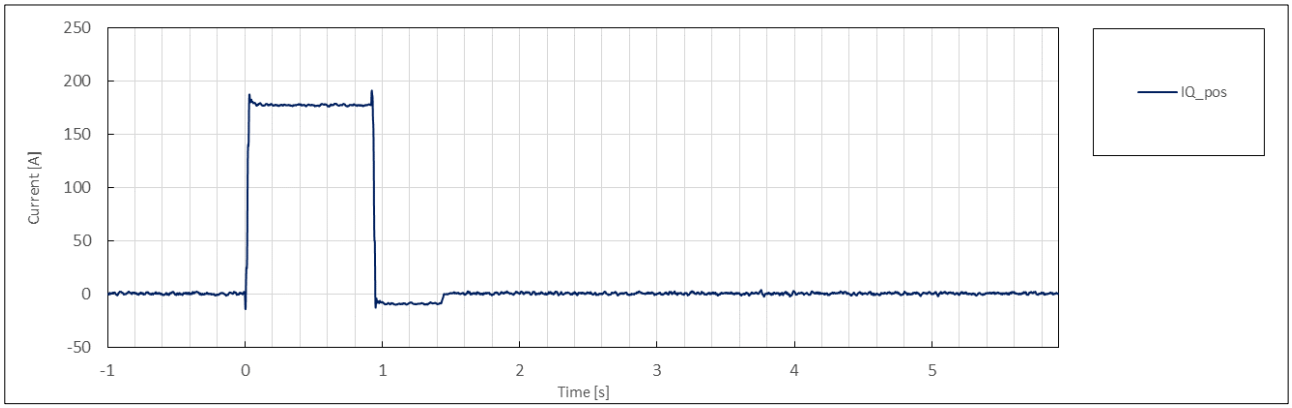


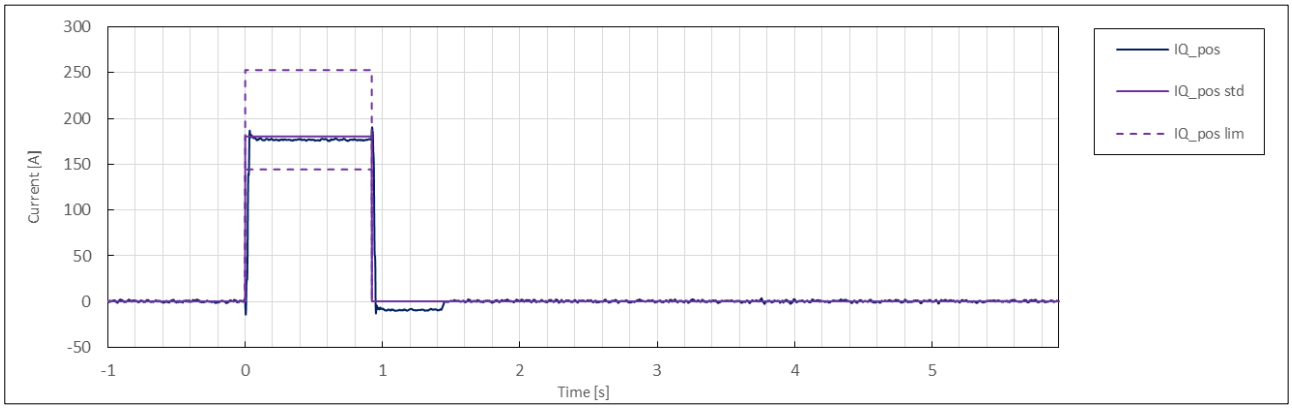

Current [A]
Time [s]
Ia
Ib
Ic

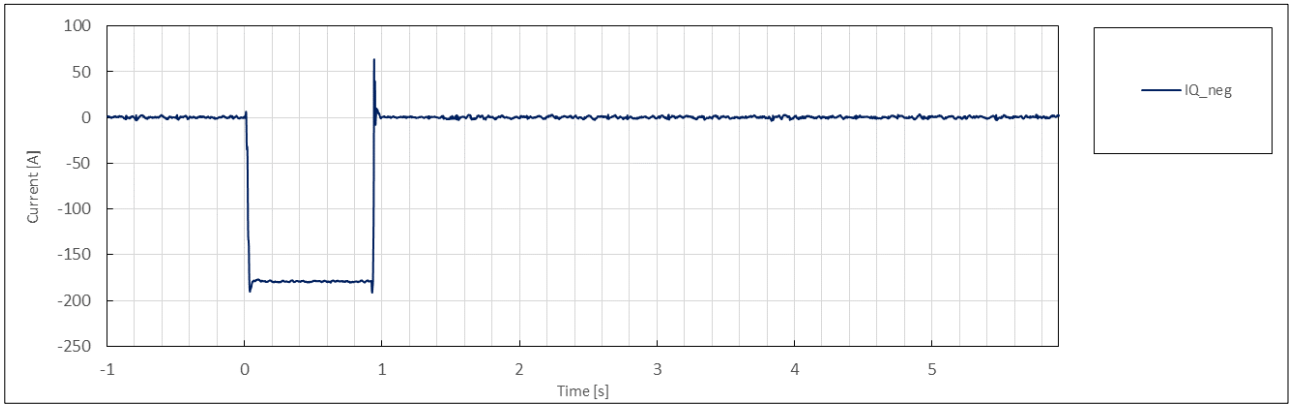

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

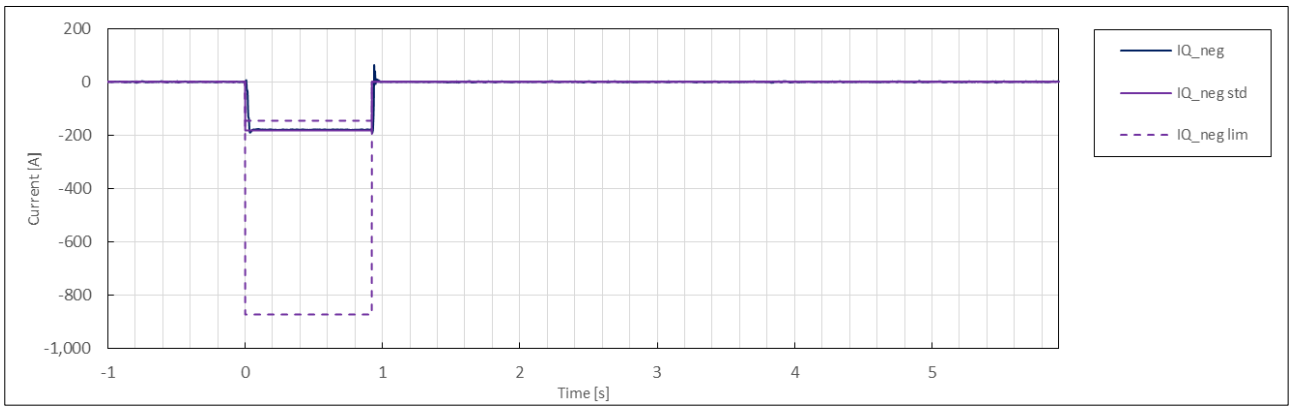

Current [A]
Time [s]
IP_pos

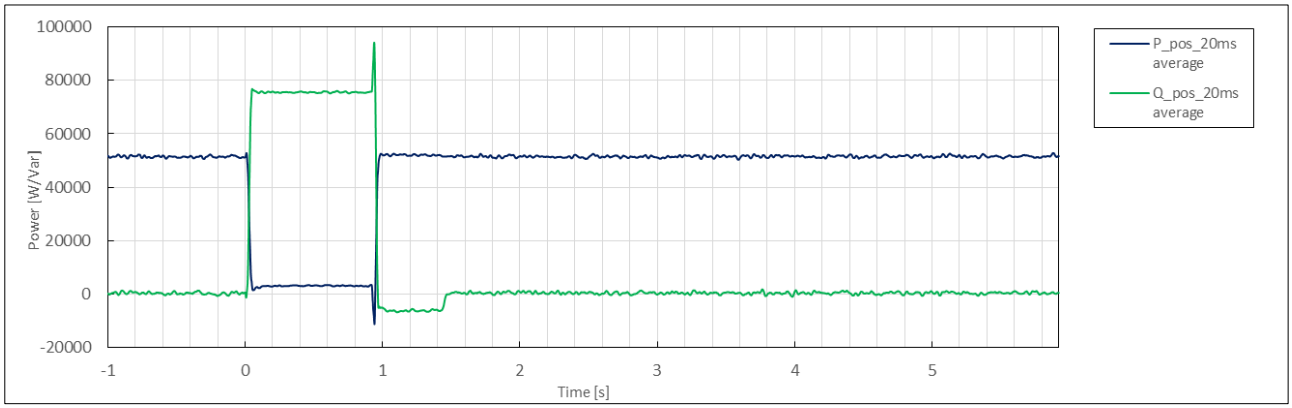

Current [A]
Time [s]
IP_pos
IP_posstd


250
200
150
100
50
0
-50
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos

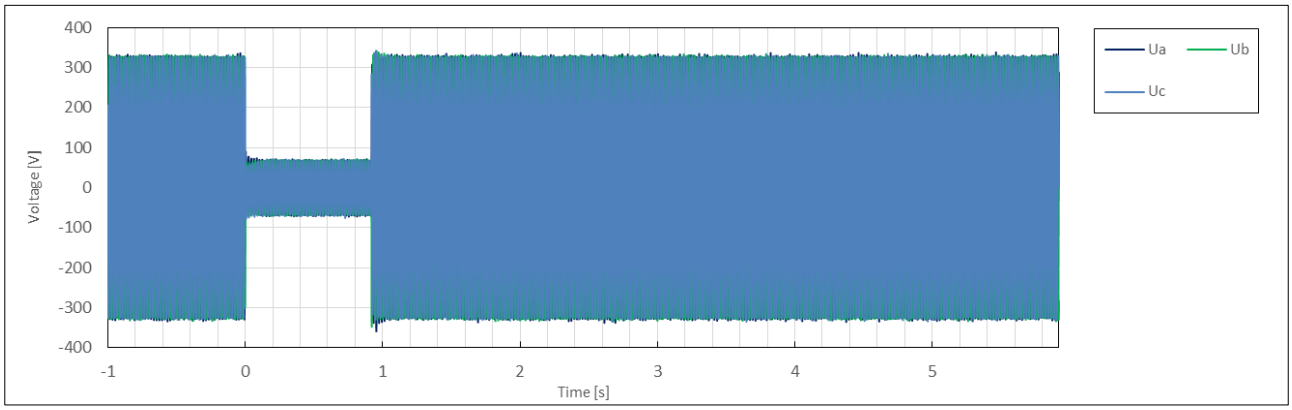

300
250
200
150
100
50
0
-50
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

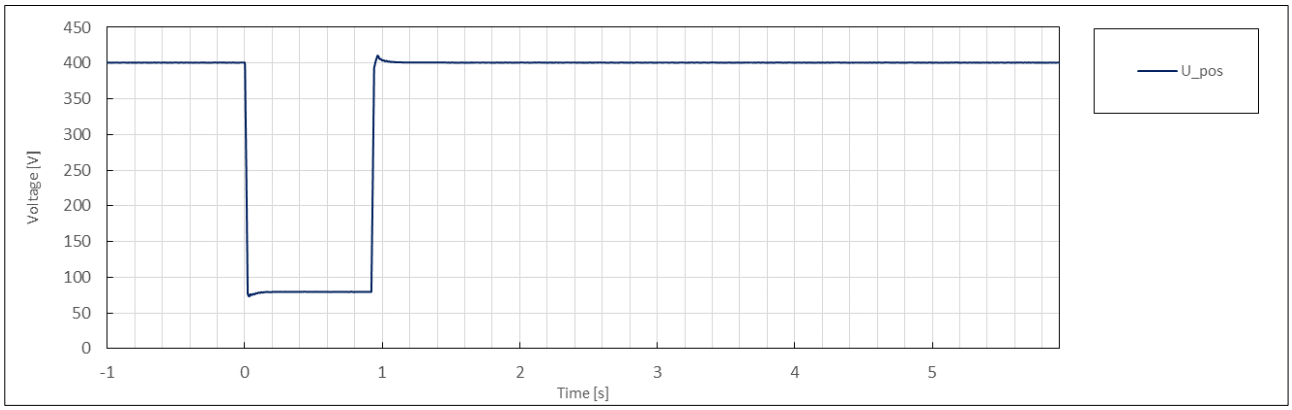

100
50
0
-50
-100
-150
-200
-250
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg

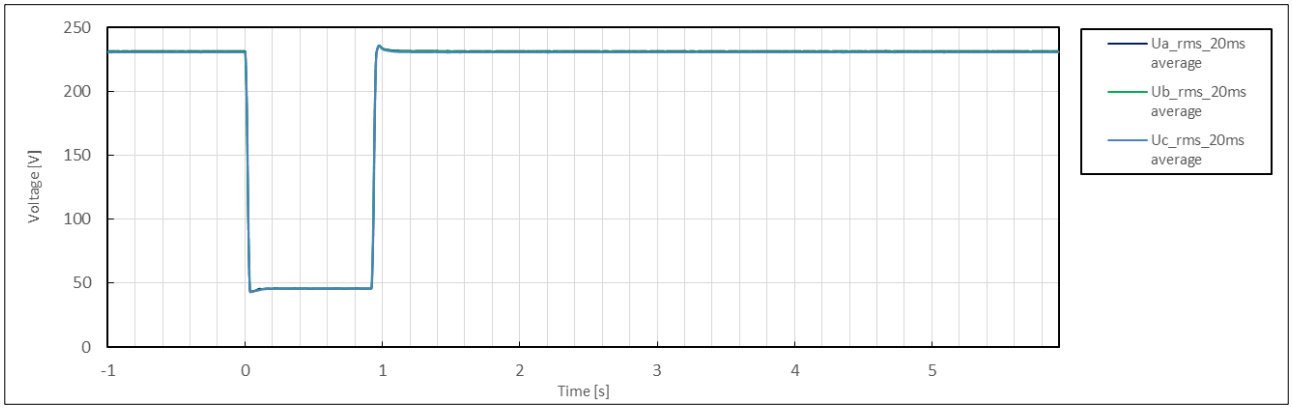

200
0
-200
-400
-600
-800
-1,000
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


100000
80000
60000
40000
20000
0
-20000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

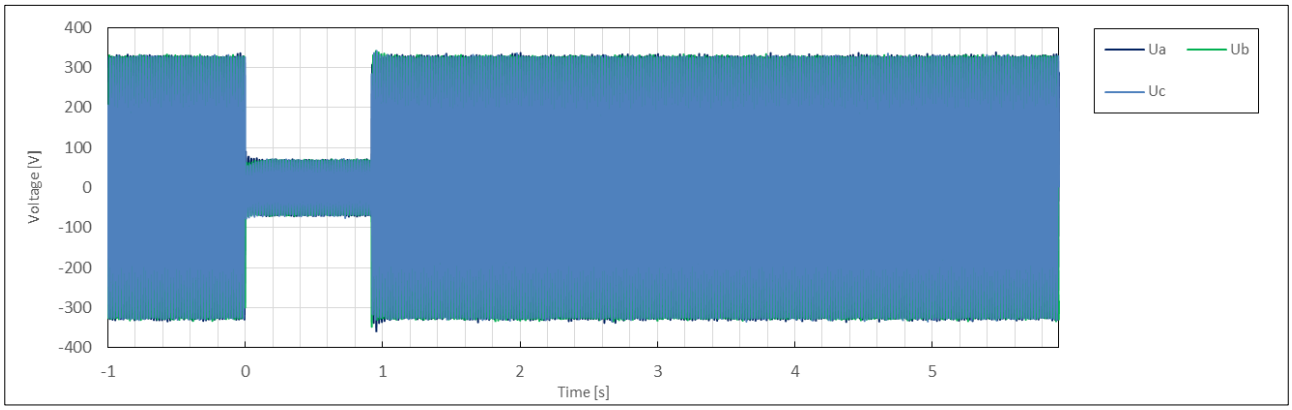
No. 2.5 Idle Test

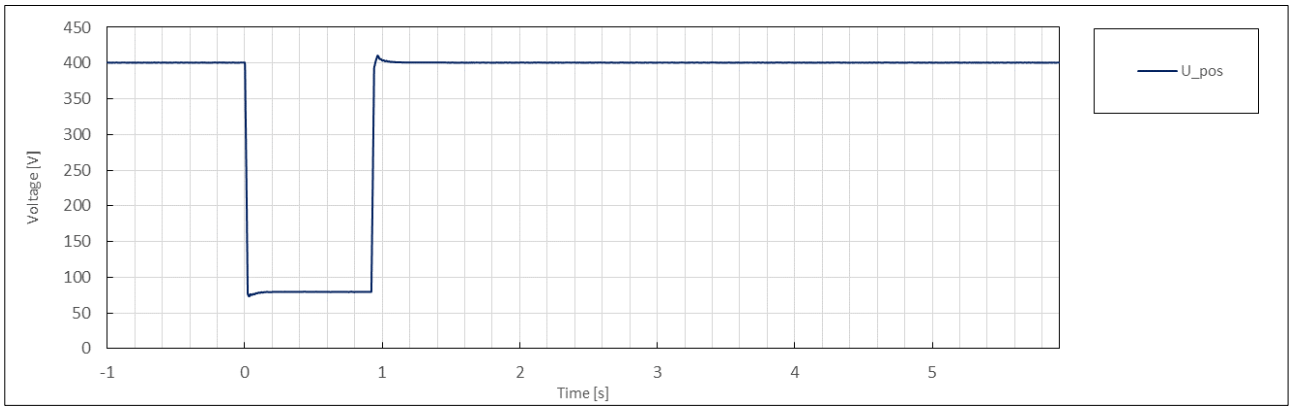


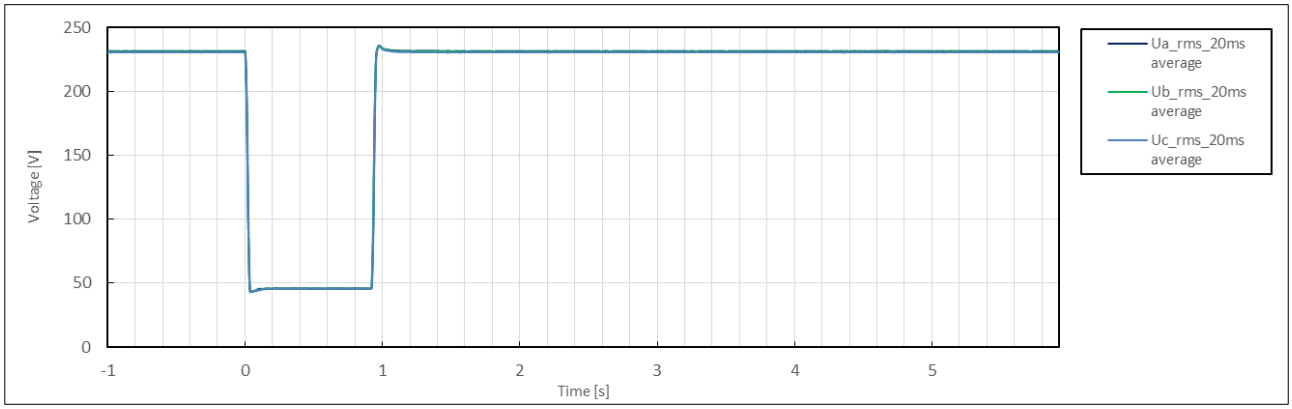


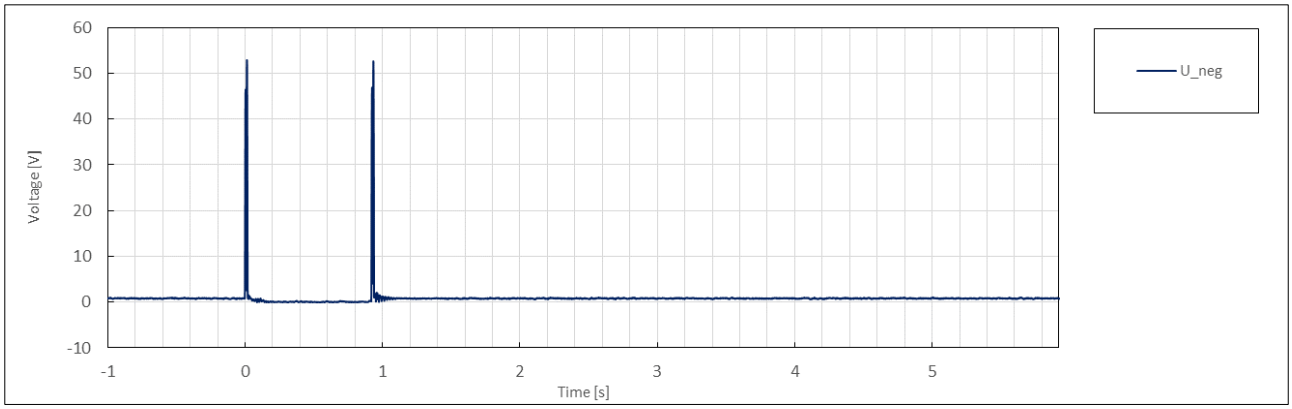


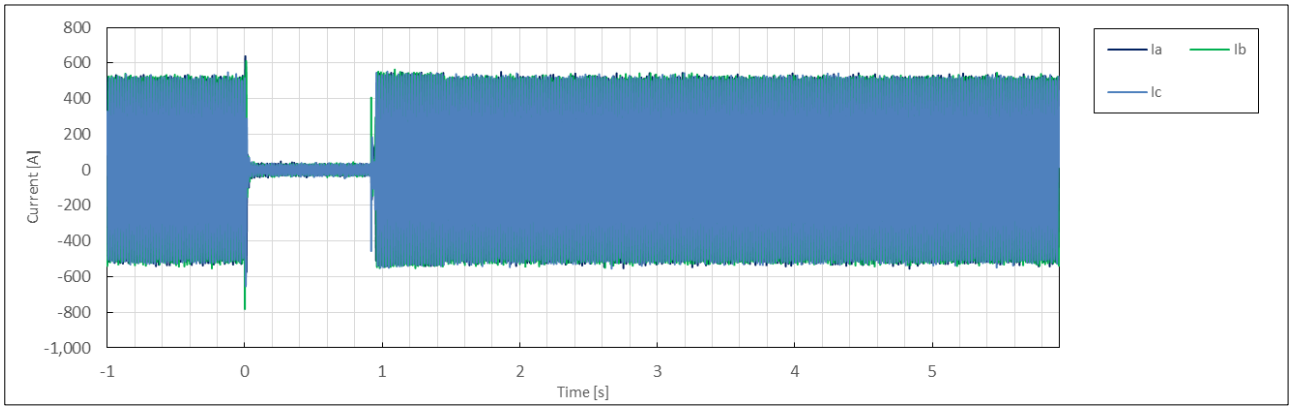
No. 2.5 Load Test

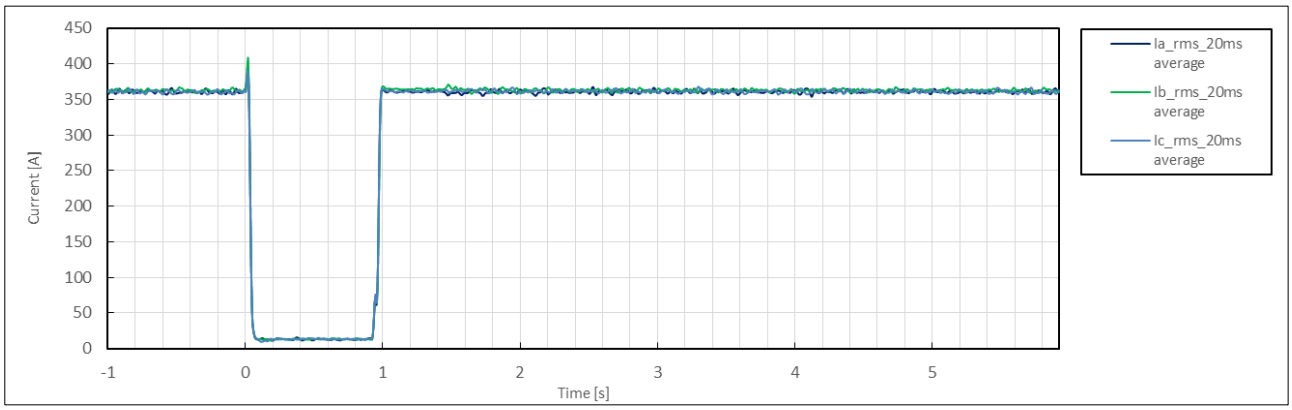


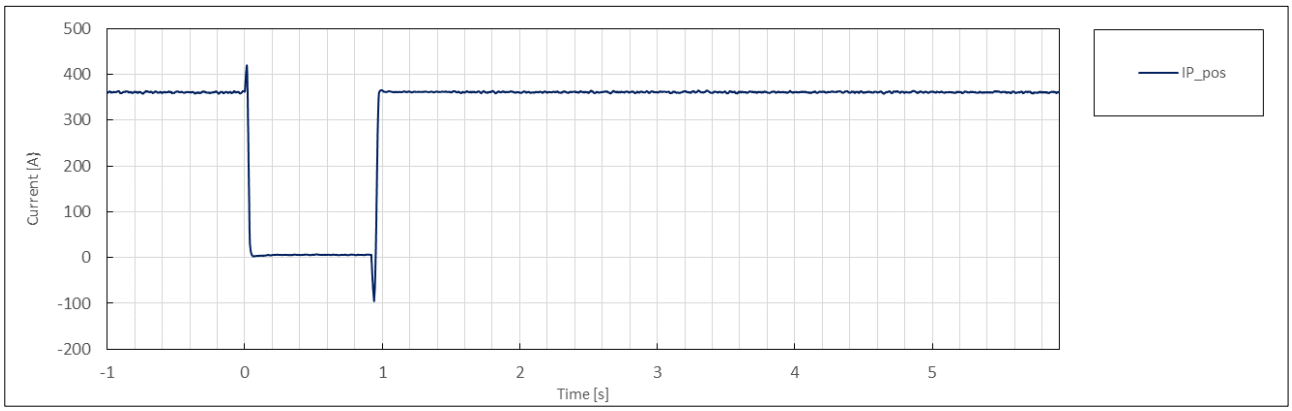


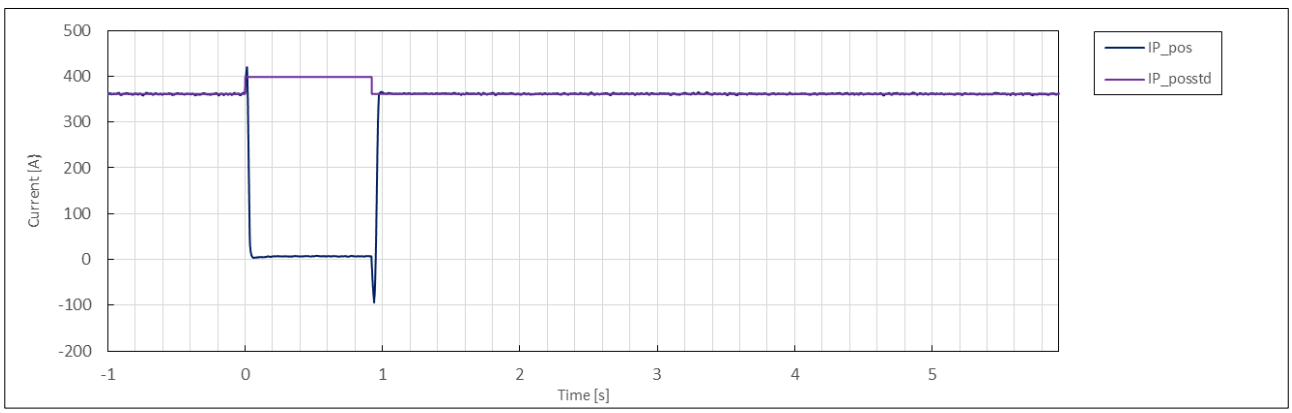


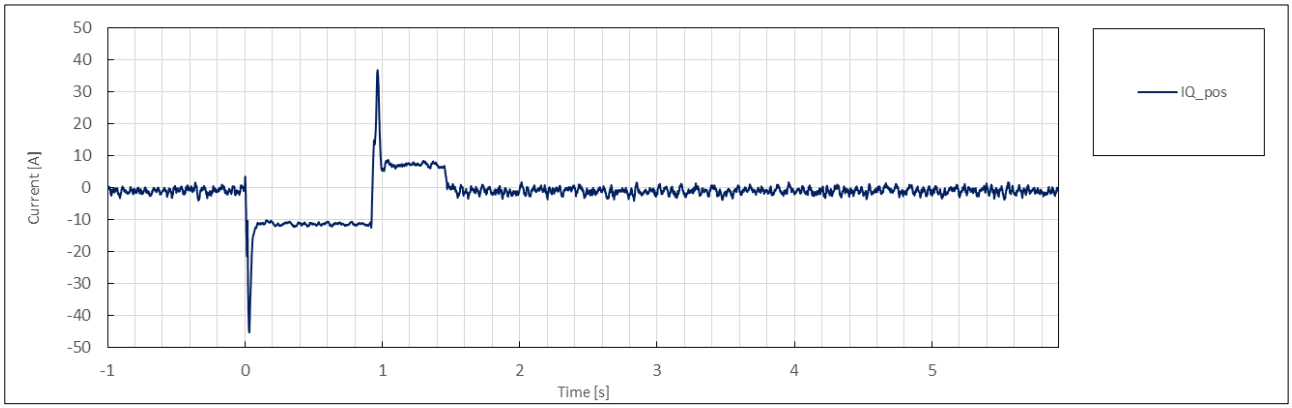


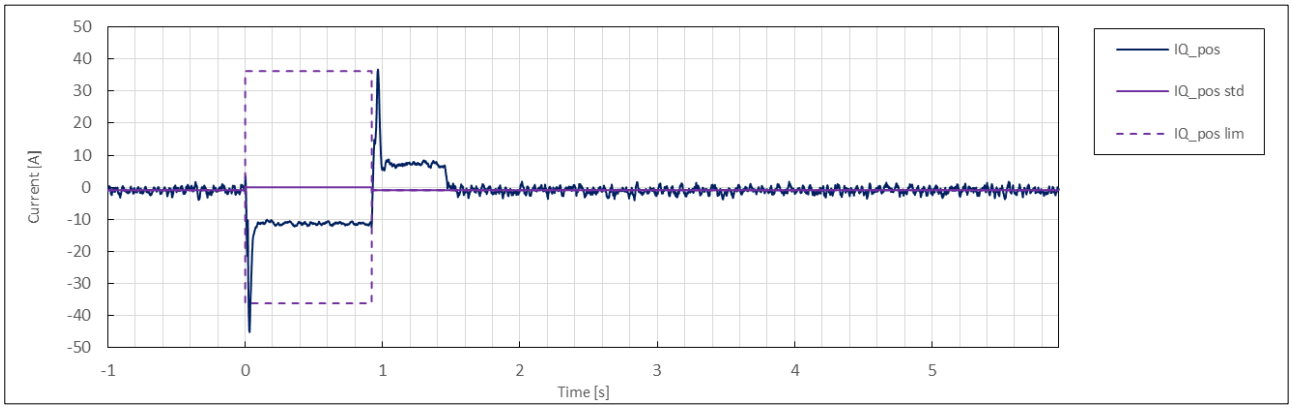

800
600
400
200
0
-200
-400
-600
-800
-1,000
Current [A]
-1
0
1
2
3
4
5
Time [s]
Ia
Ib
Ic

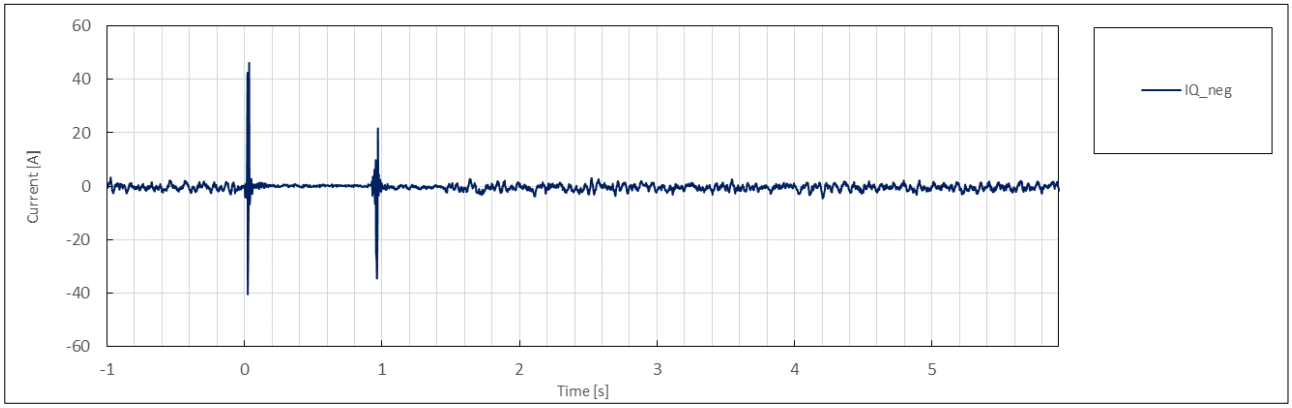

450
400
350
300
250
200
150
100
50
0
Current [A]
-1
0
1
2
3
4
5
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

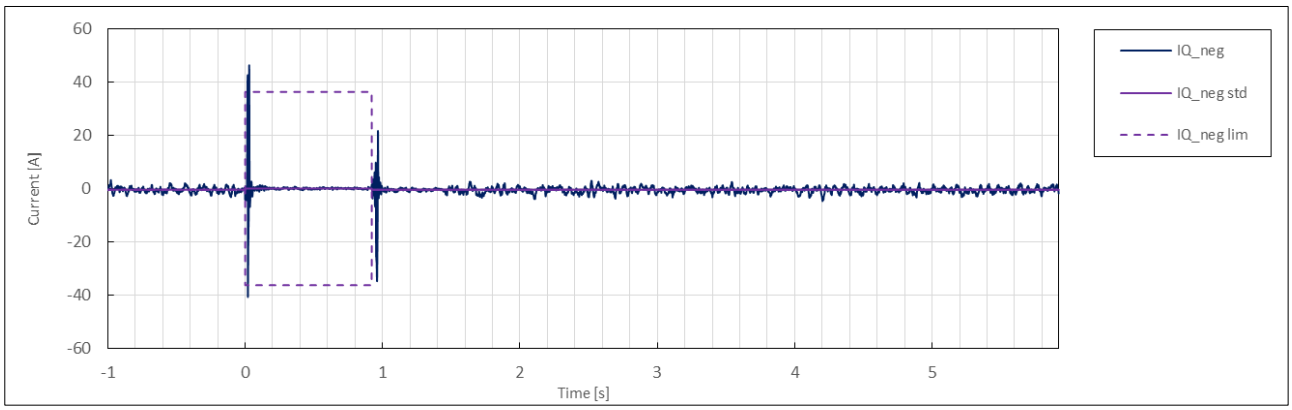

500
400
300
200
100
0
-100
-200
Current [A]
-1
0
1
2
3
4
5
Time [s]
IP_pos

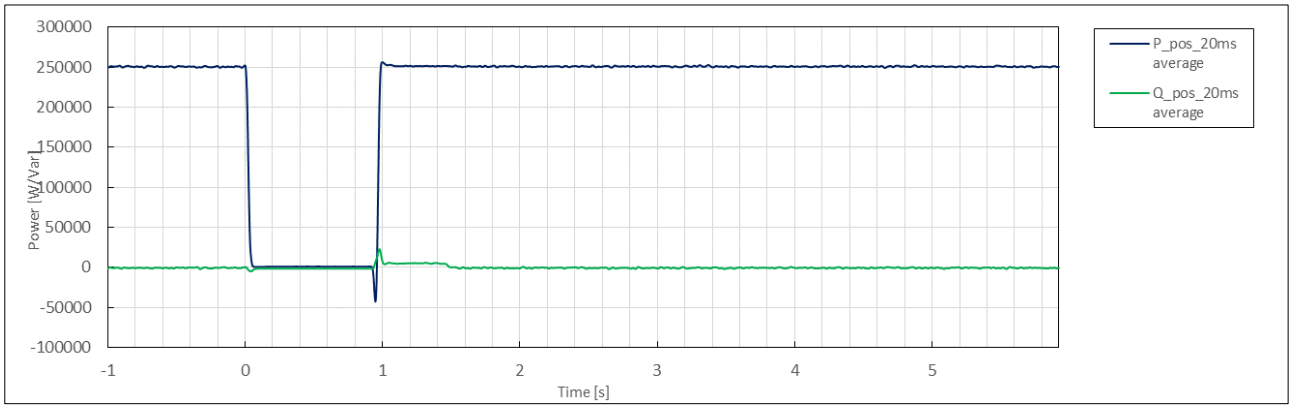

500
400
300
200
100
0
-100
-200
Current [A]
-1
0
1
2
3
4
5
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

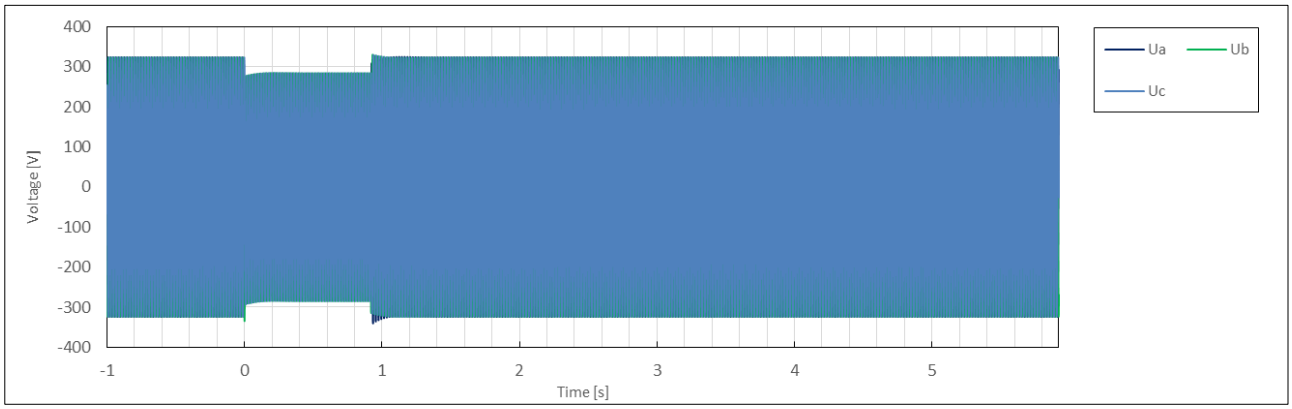

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

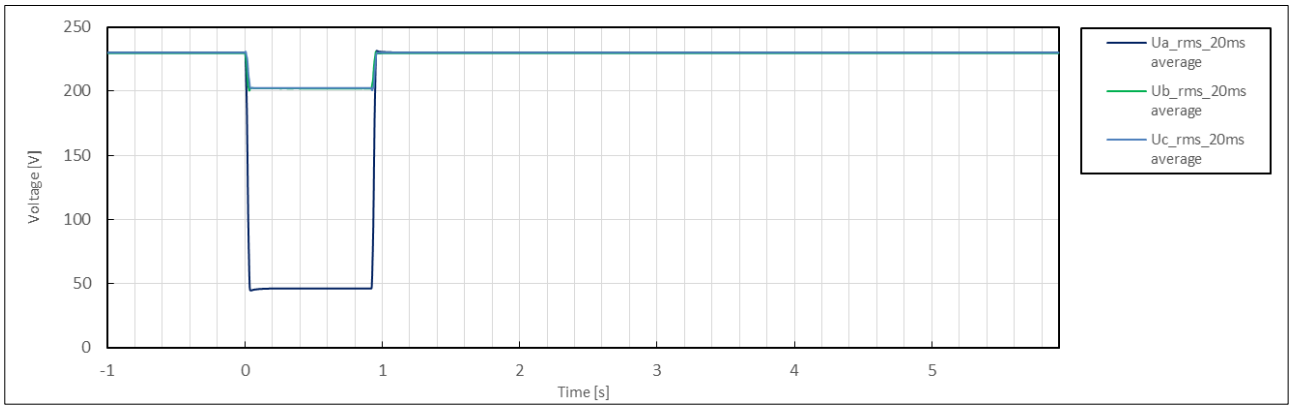

Current [A]
Time [s]
IQ_neg

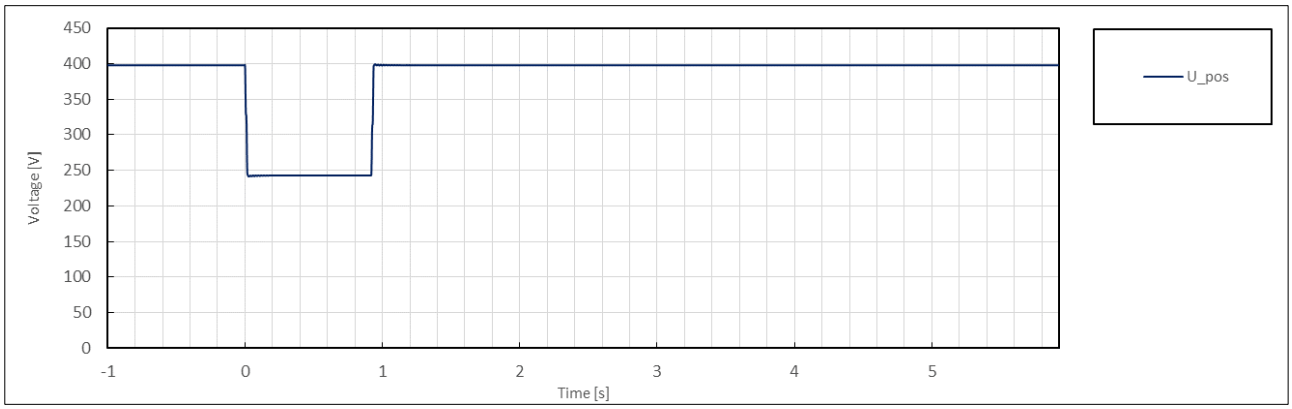

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

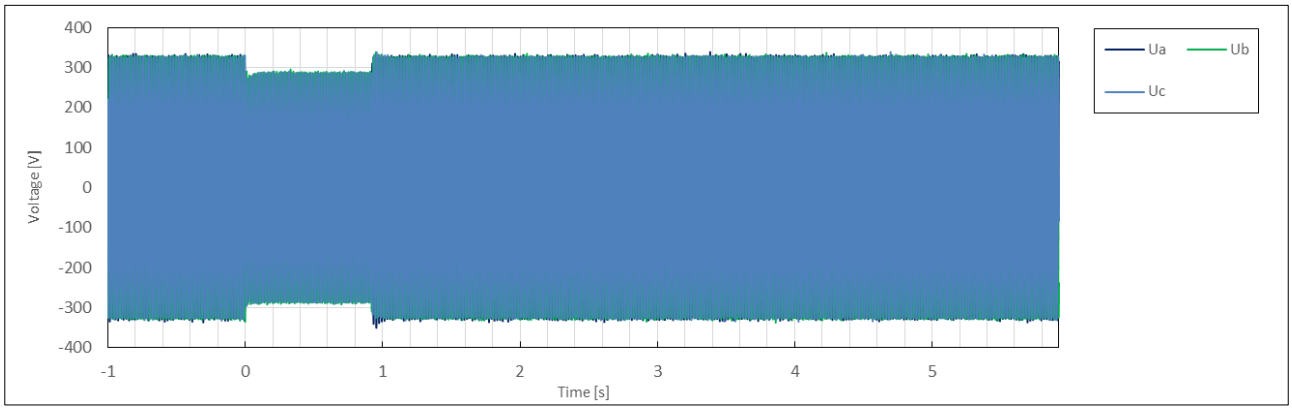
No. 2.6 Idle Test

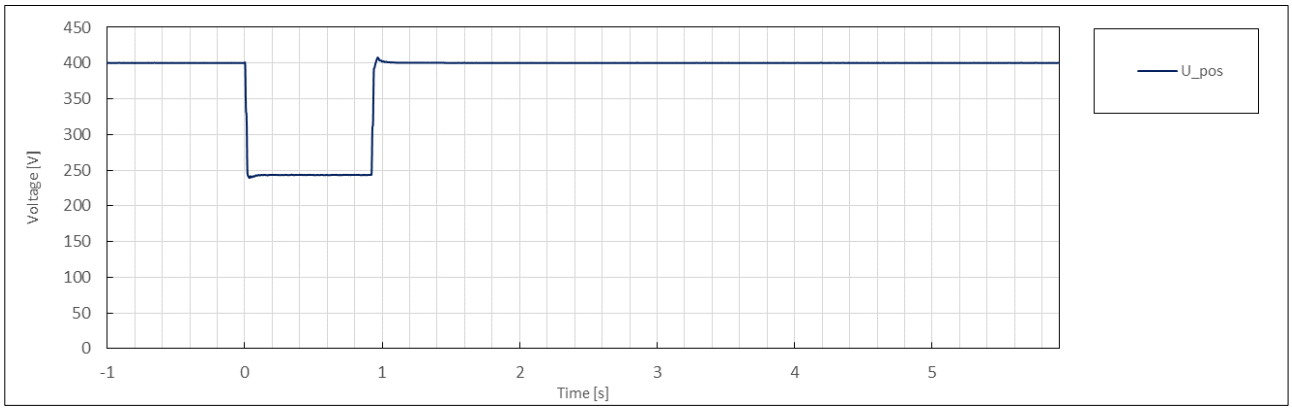


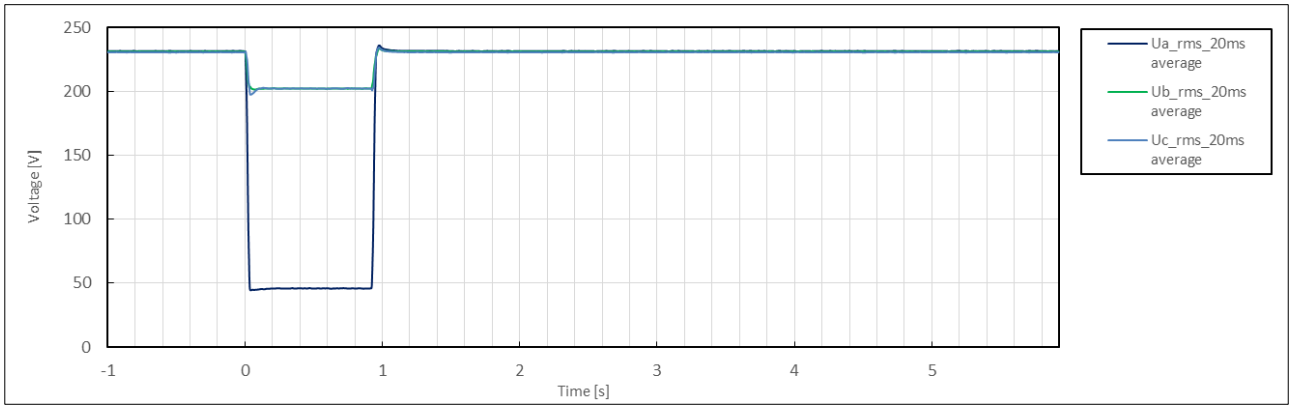


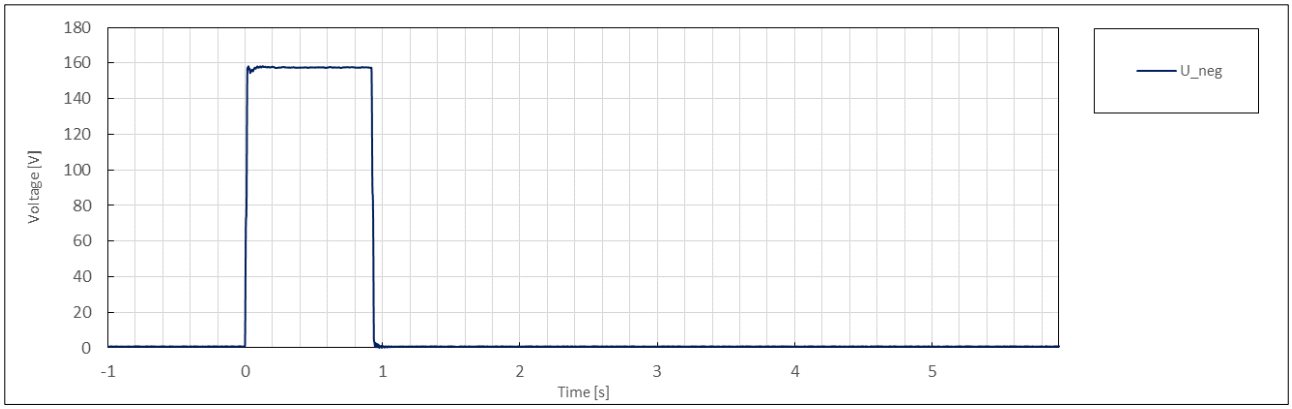


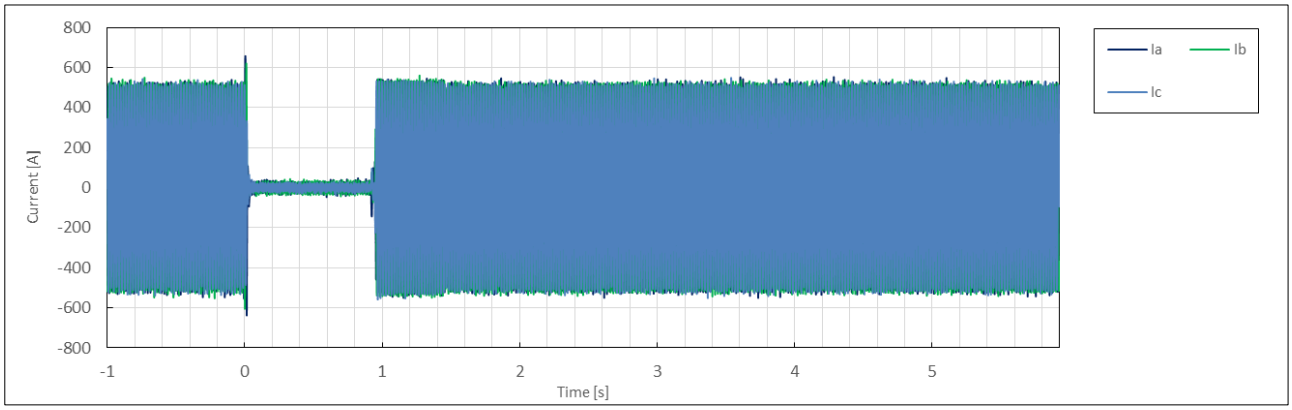
No. 2.6 Load Test

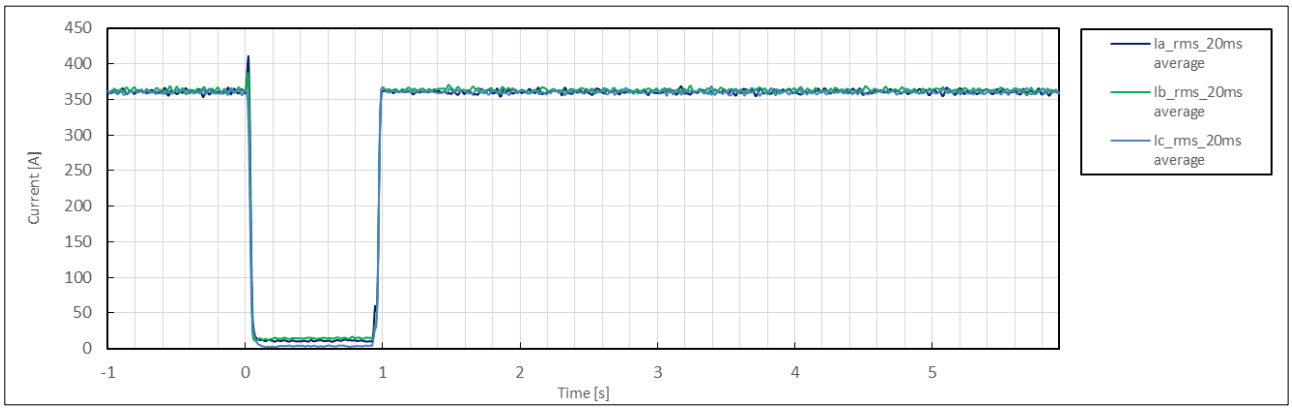


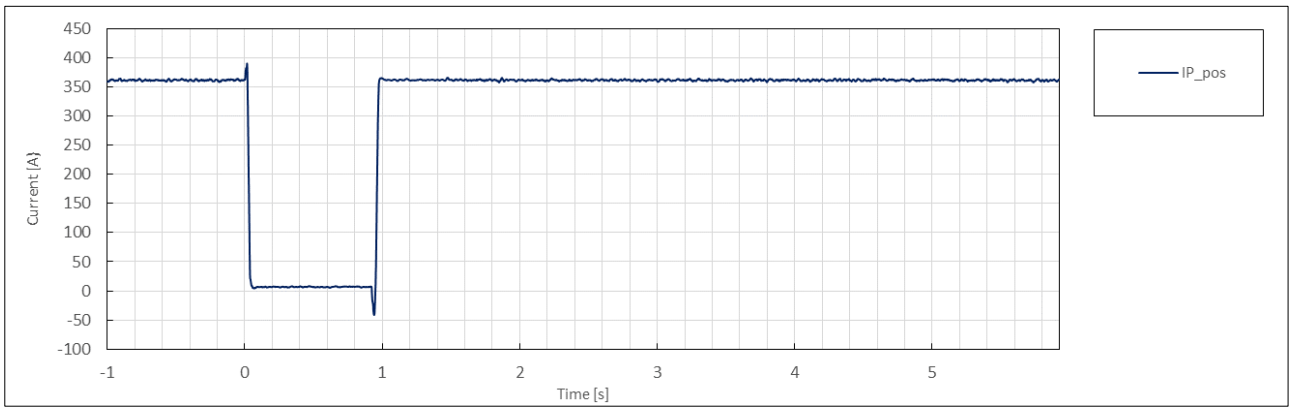


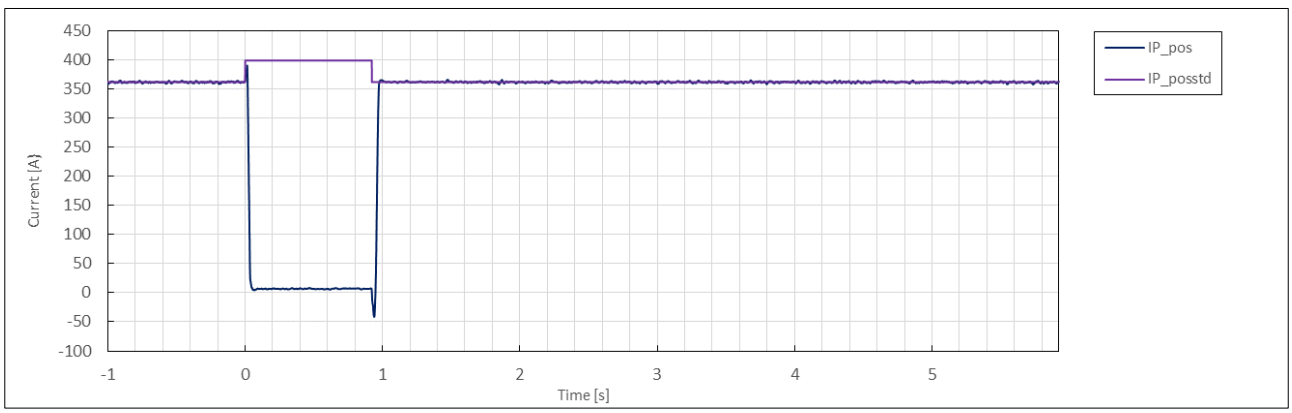


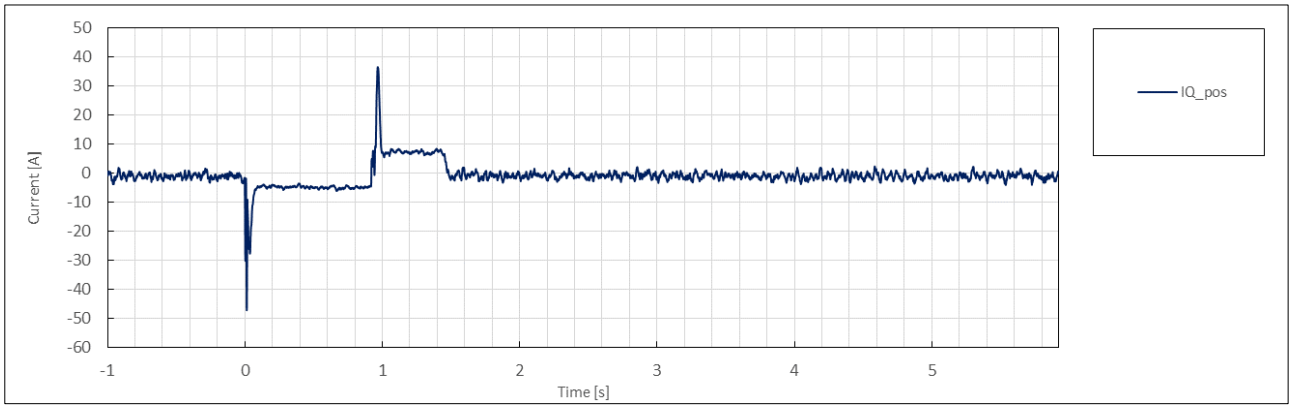


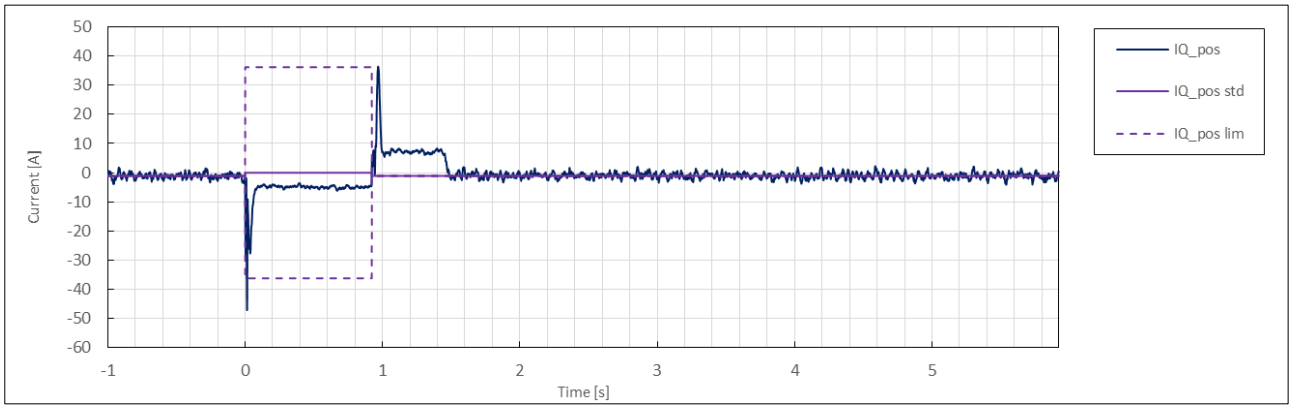

Current [A]
Time [s]
Ia
Ib
Ic

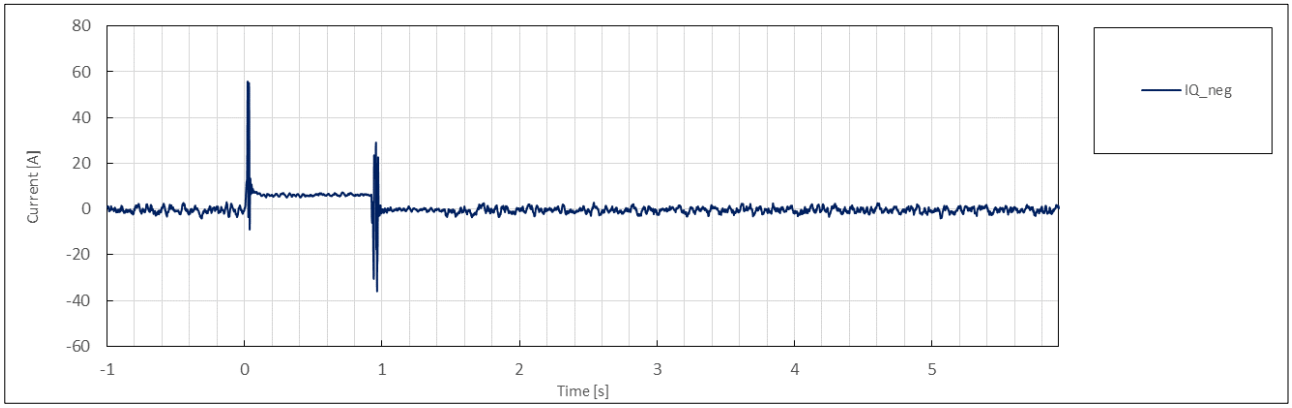

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

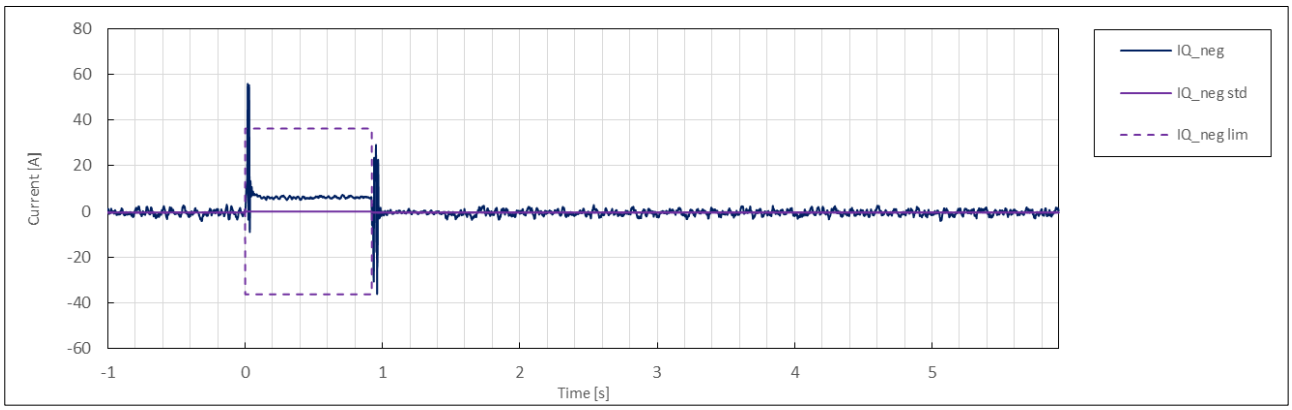

Current [A]
Time [s]
IP_pos

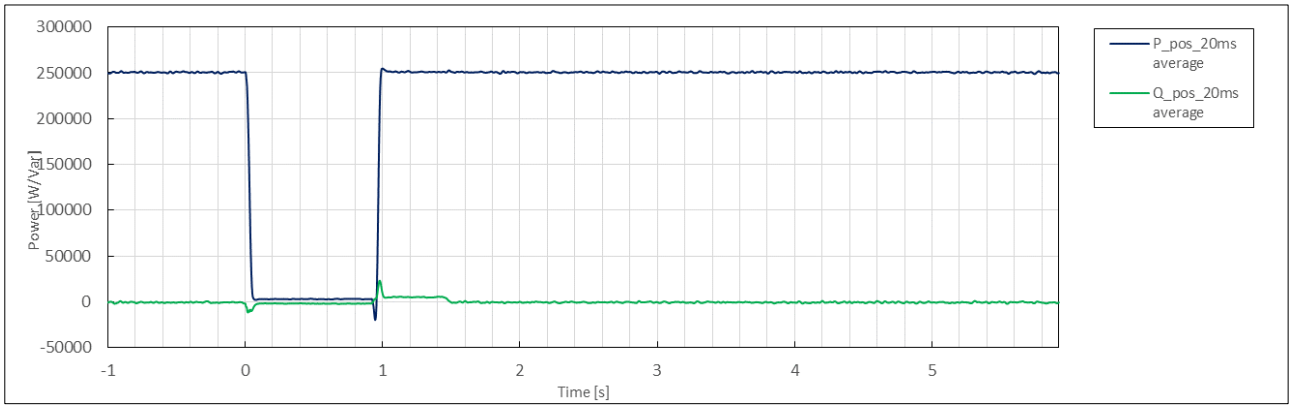

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

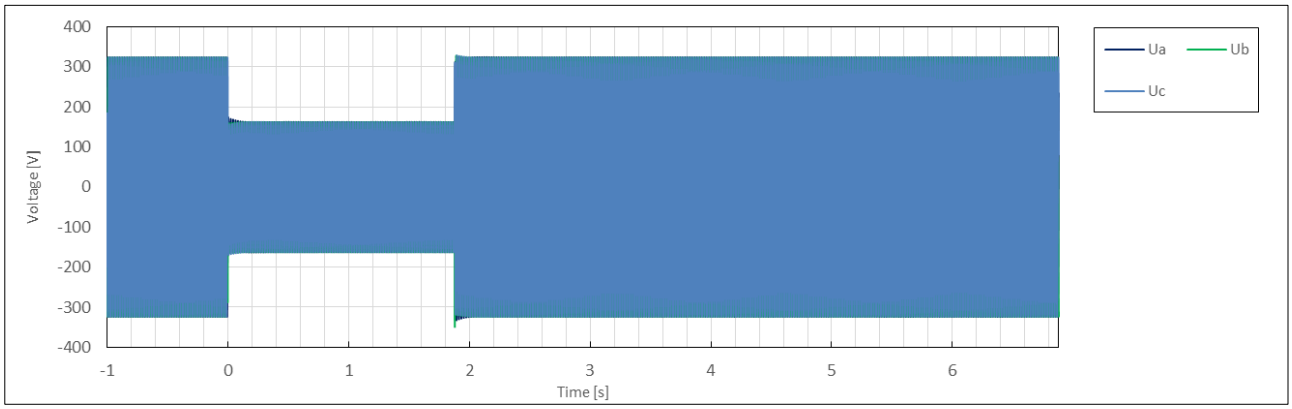

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

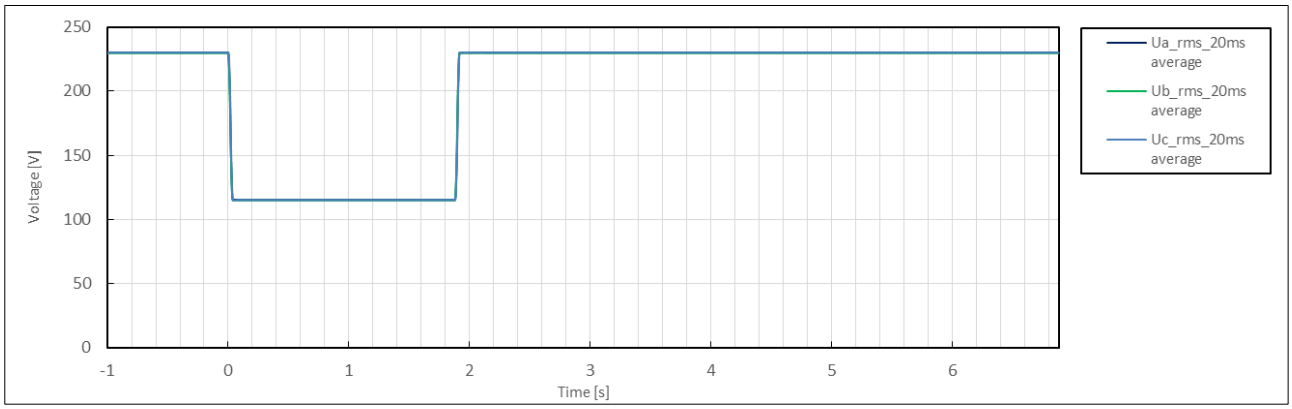

Current [A]
Time [s]
IQ_neg

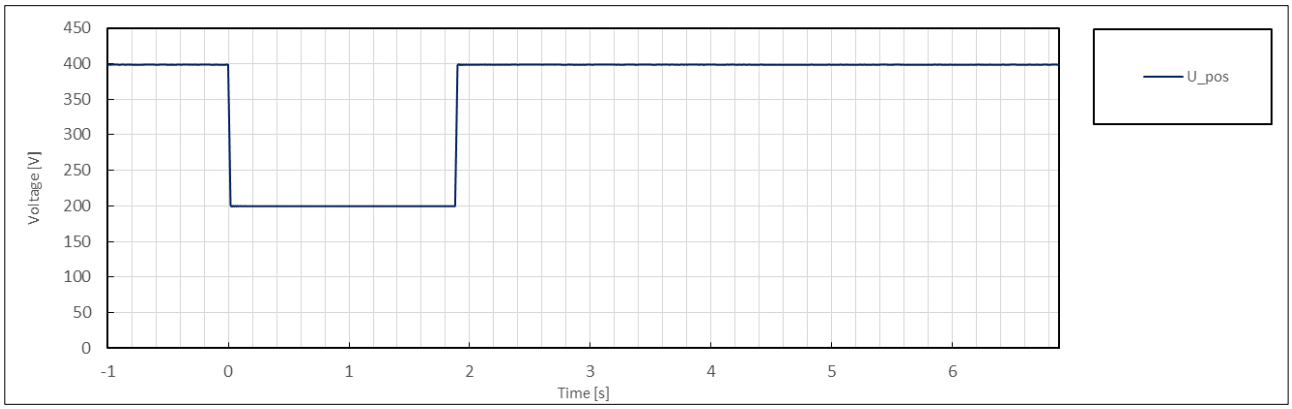

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

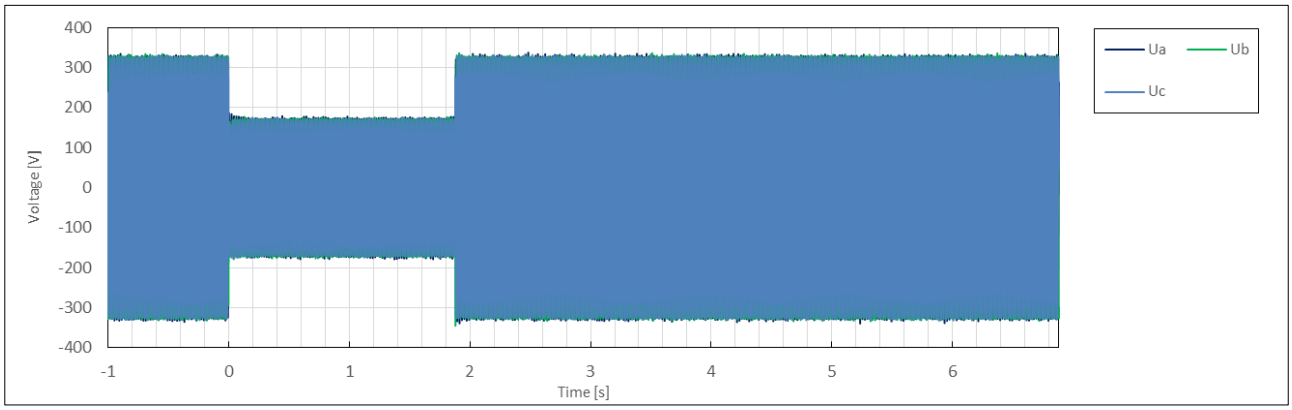
No. 3.1 Idle Test

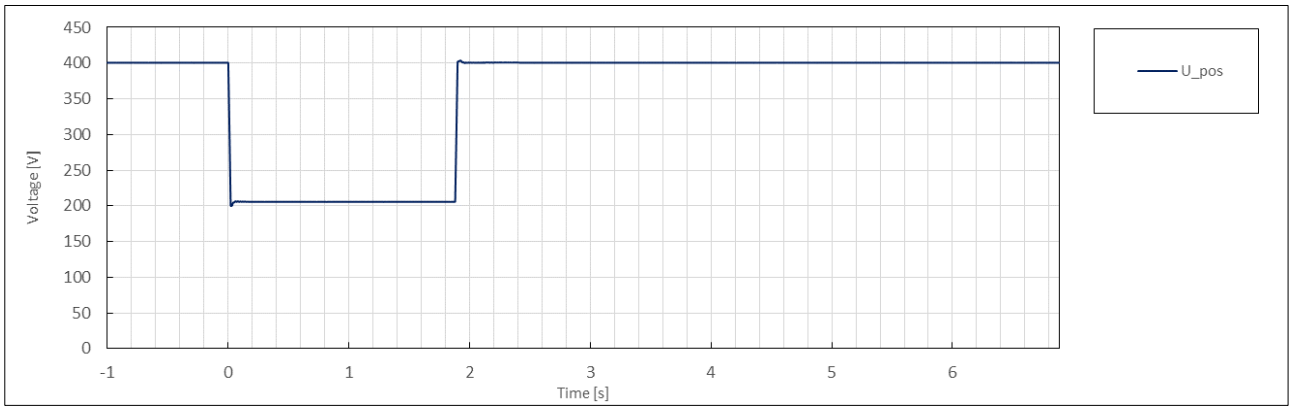


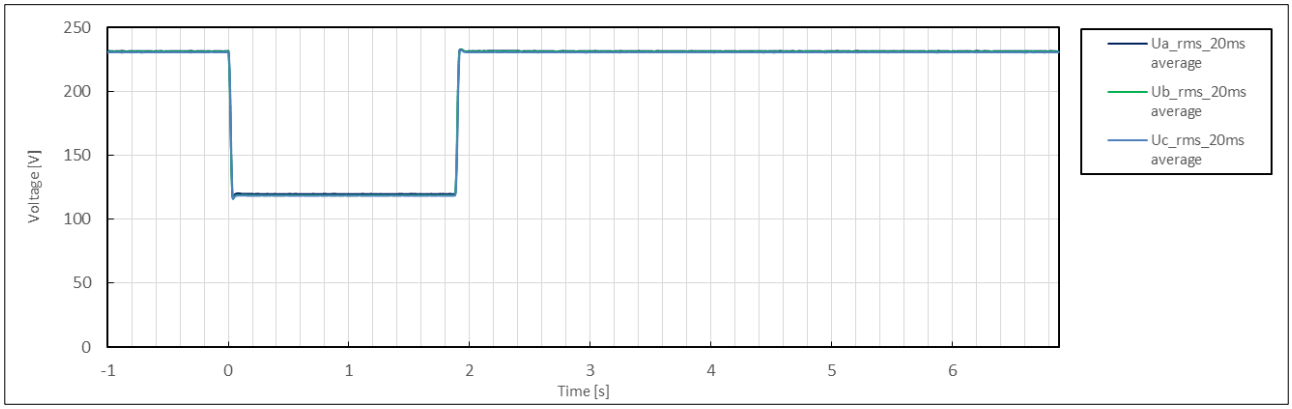


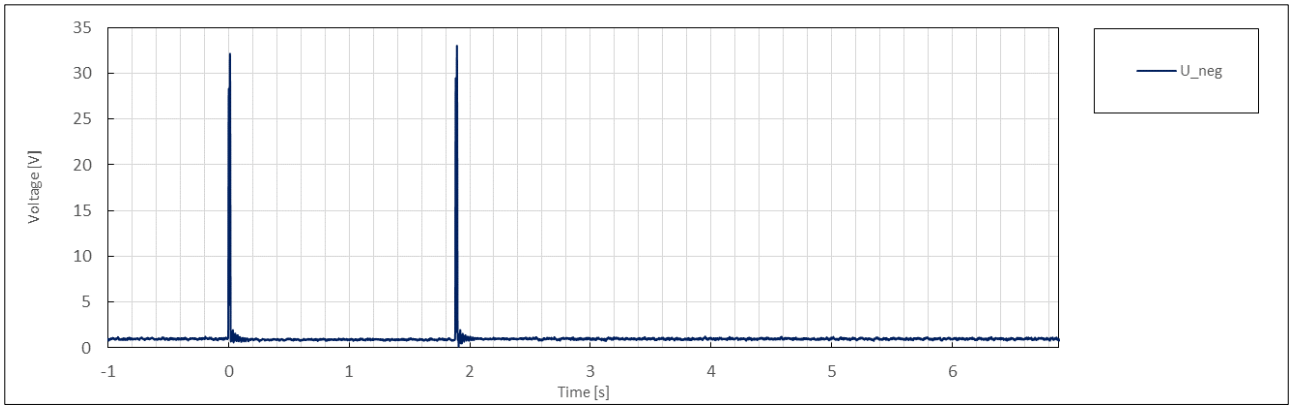


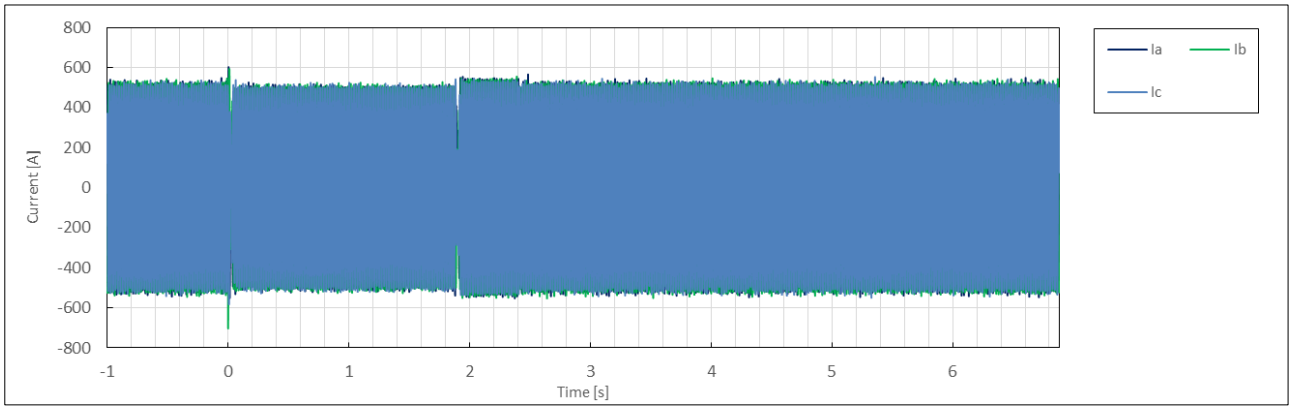
No. 3.1 Load Test

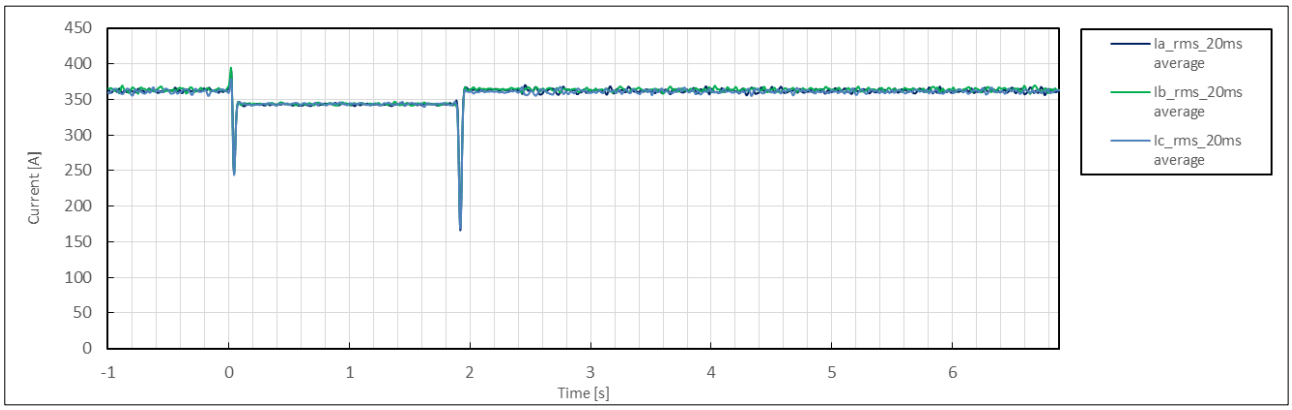


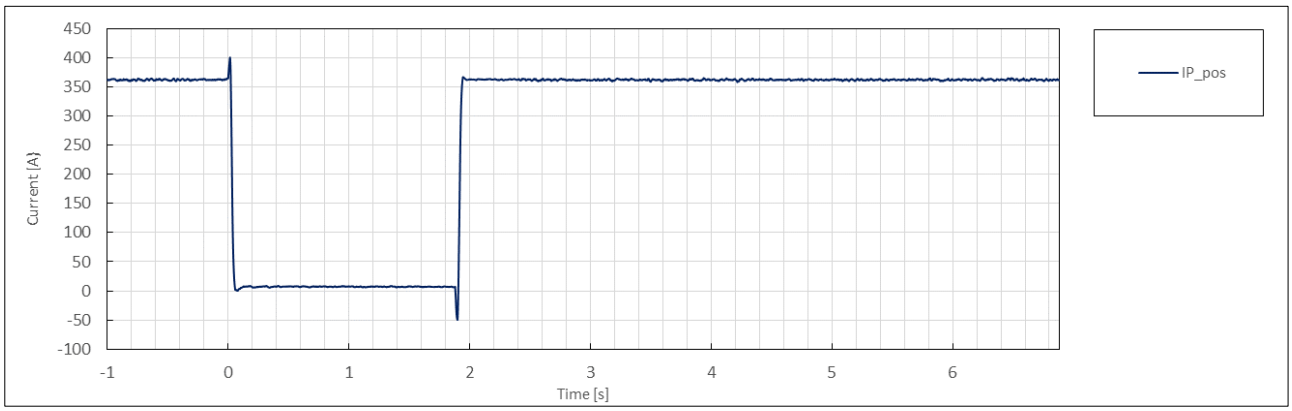


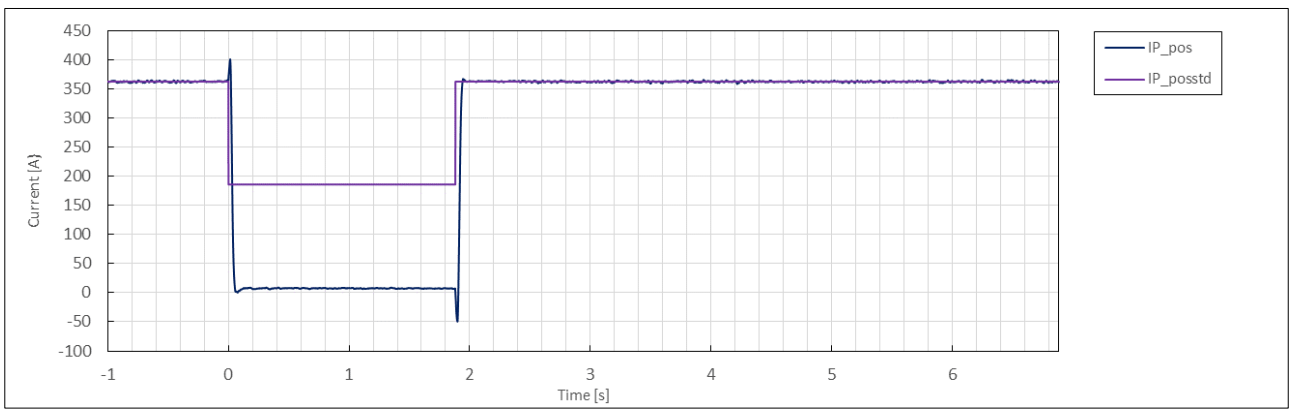


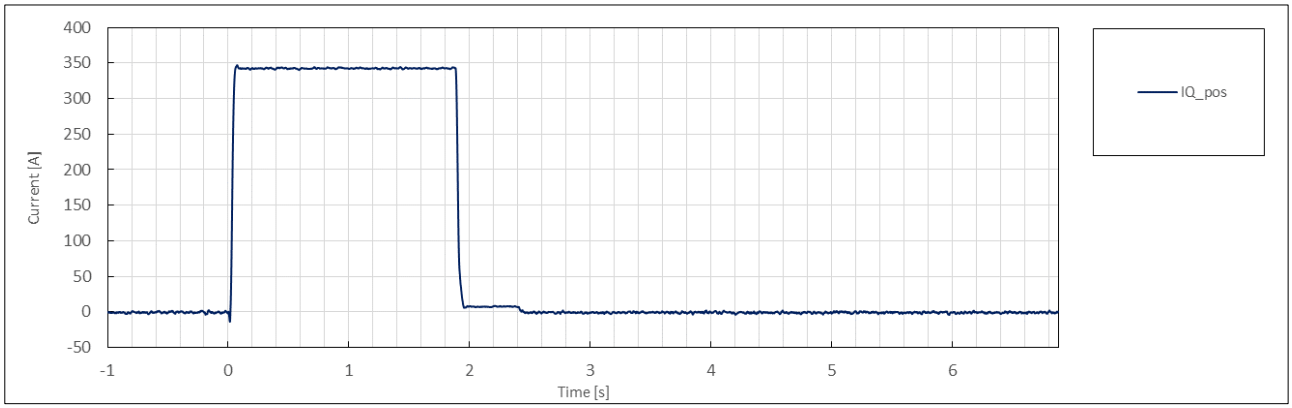


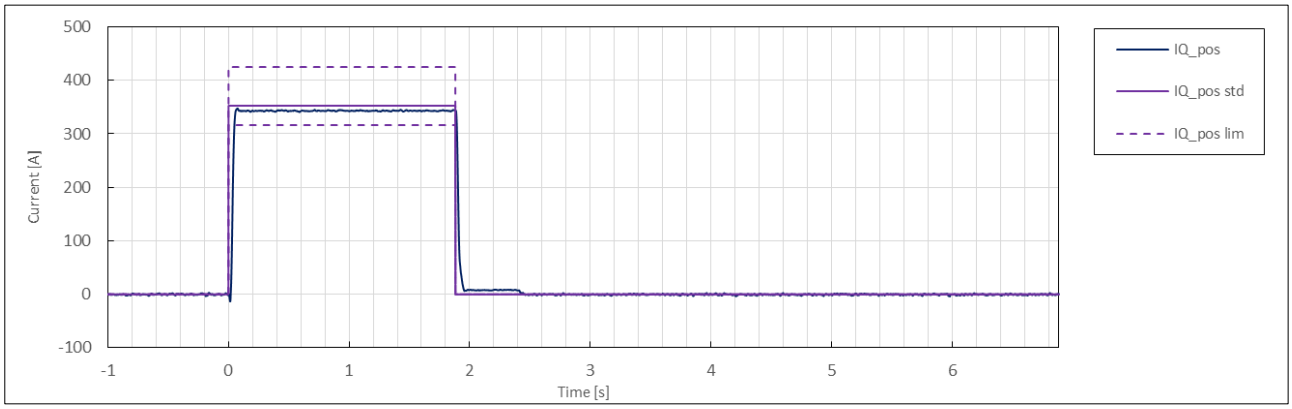

Current [A]
Time [s]
Ia
Ib
Ic

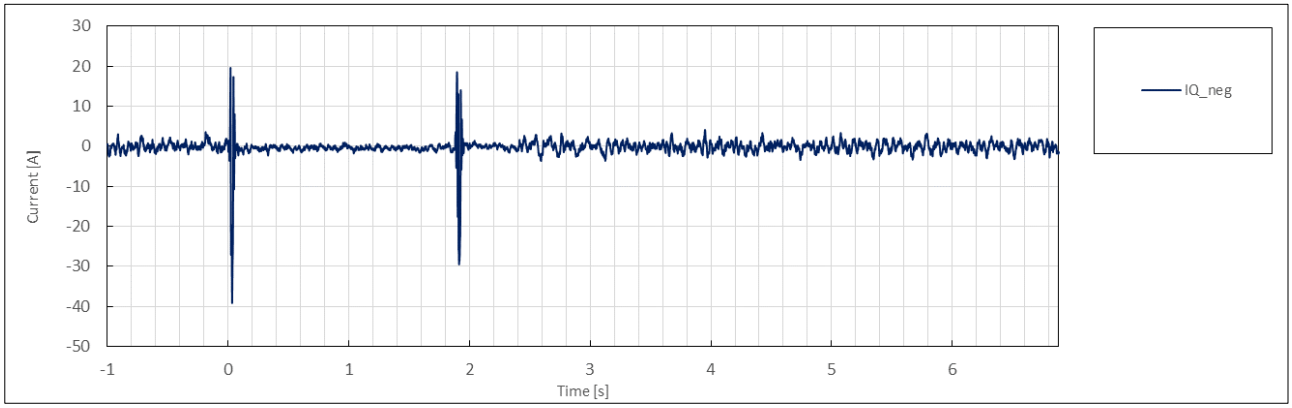

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

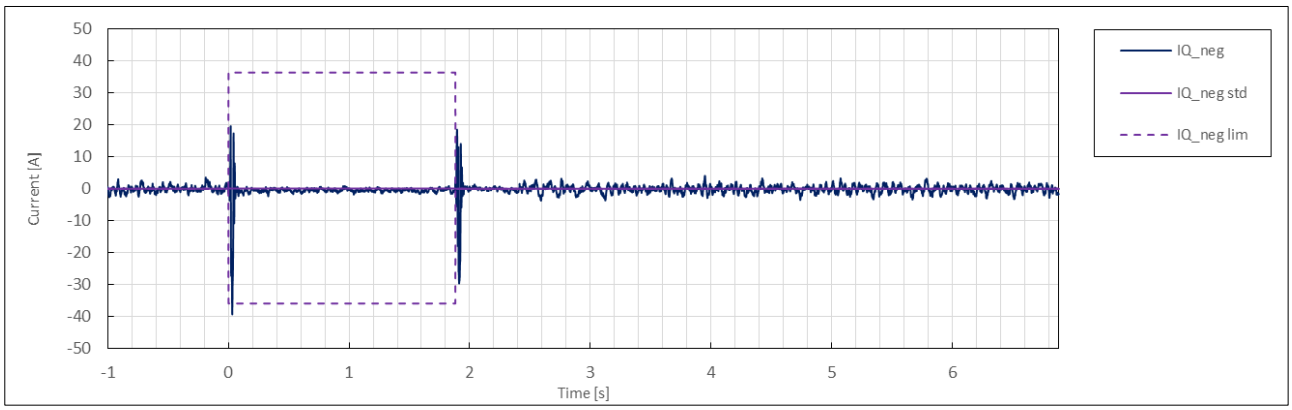

Current [A]
Time [s]
IP_pos

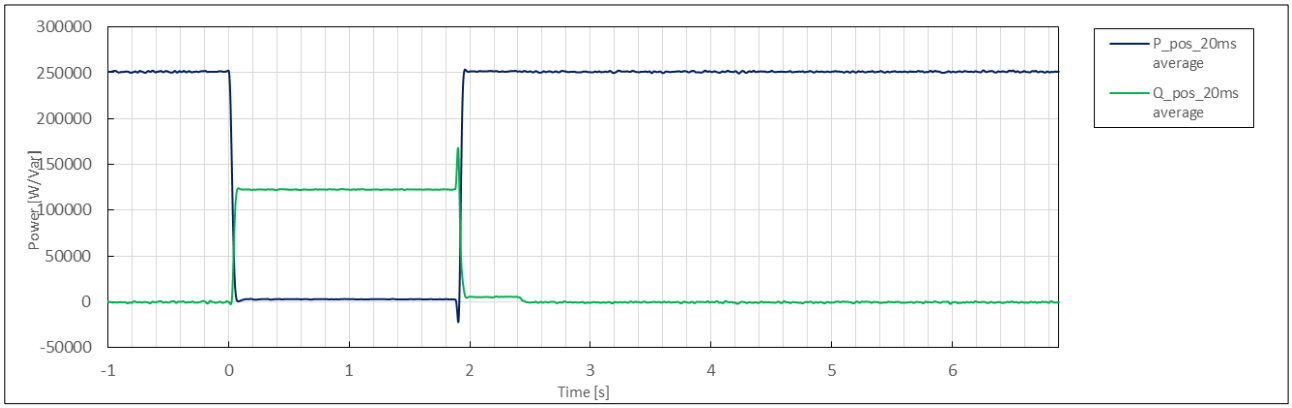

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

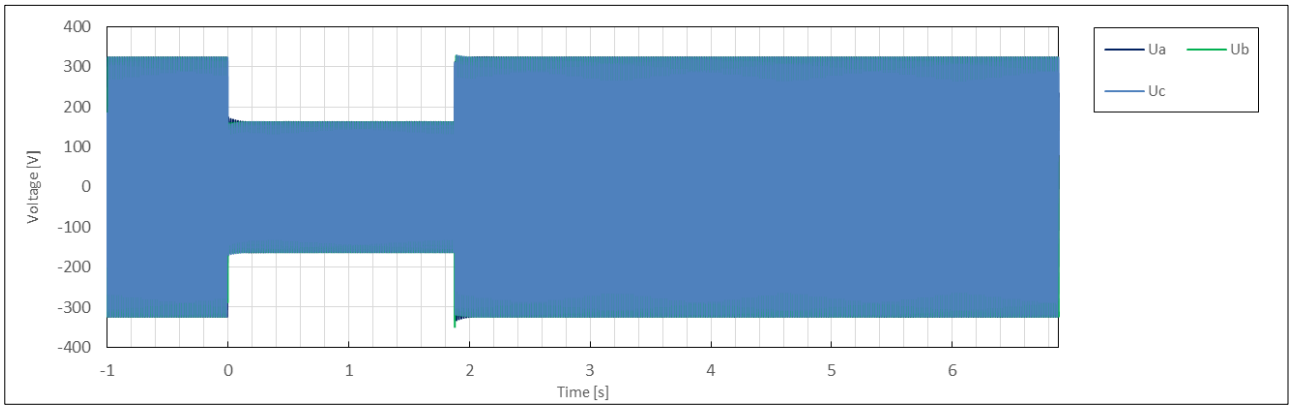

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

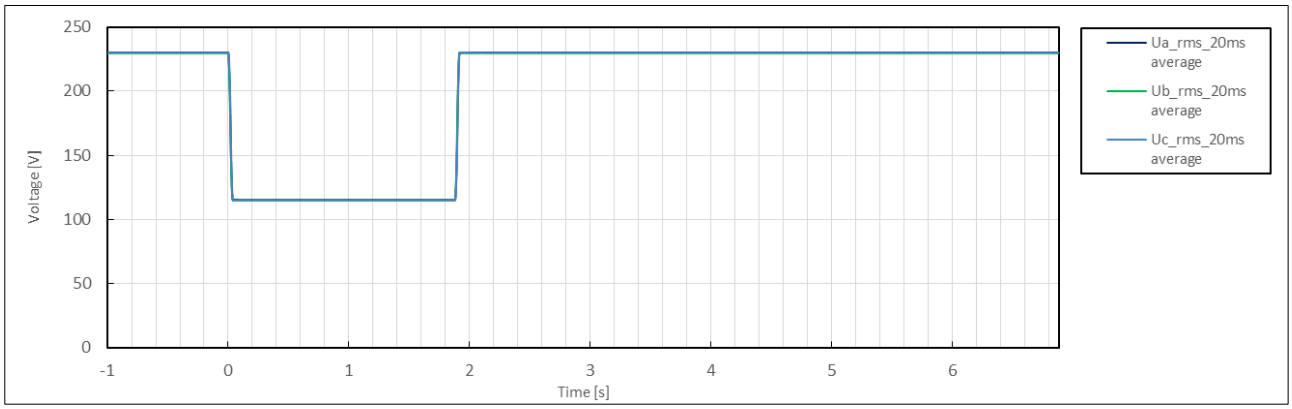

Current [A]
Time [s]
IQ_neg

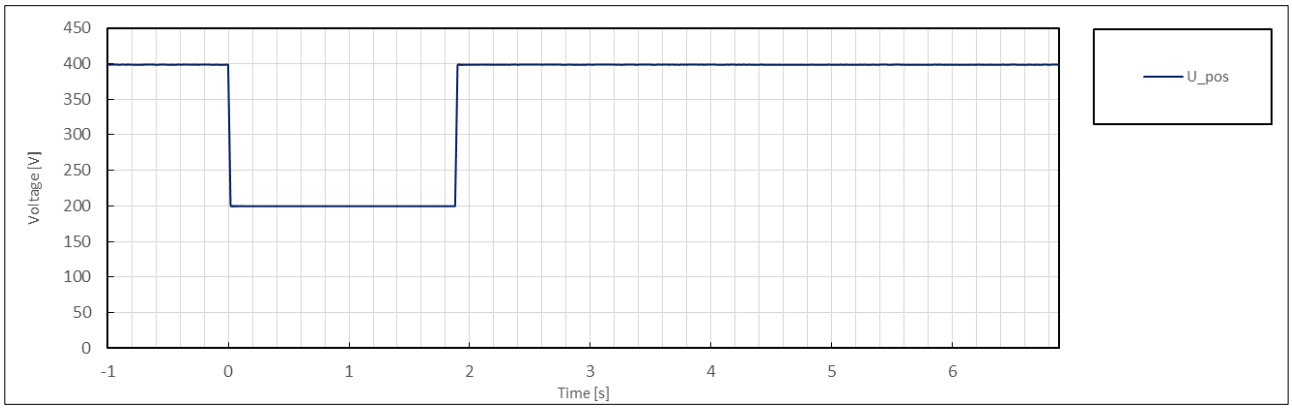

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
6
Time [s]
P_pos_20ms average
Q_pos_20ms average

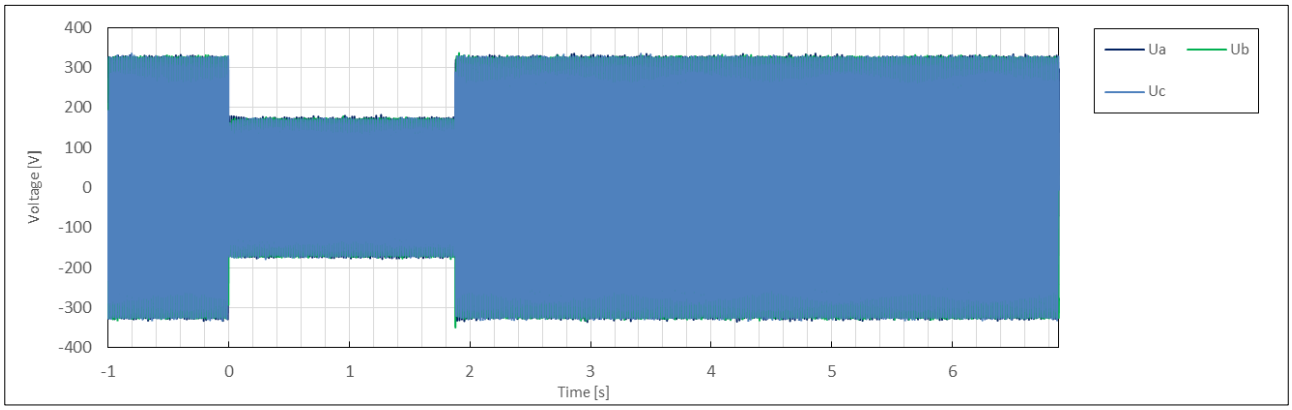
No. 3.2 Idle Test

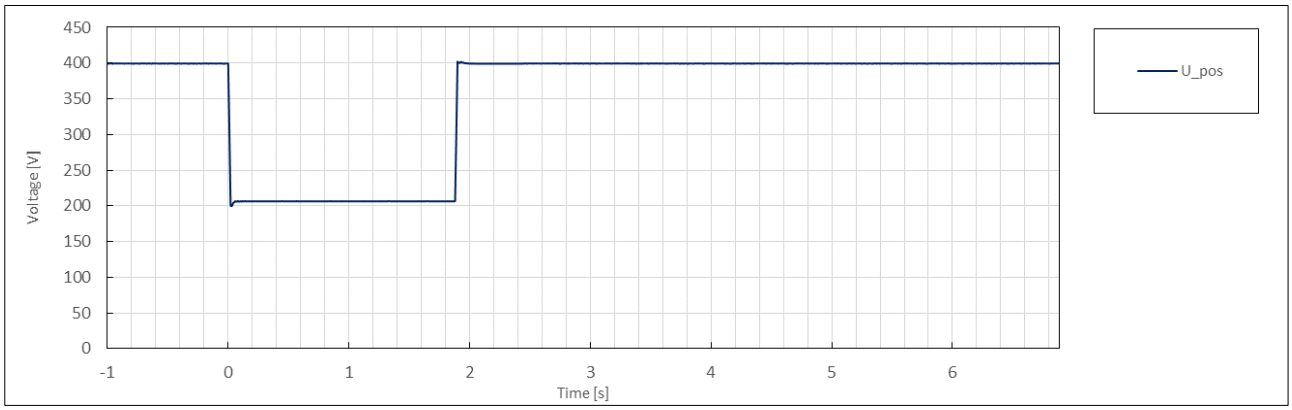


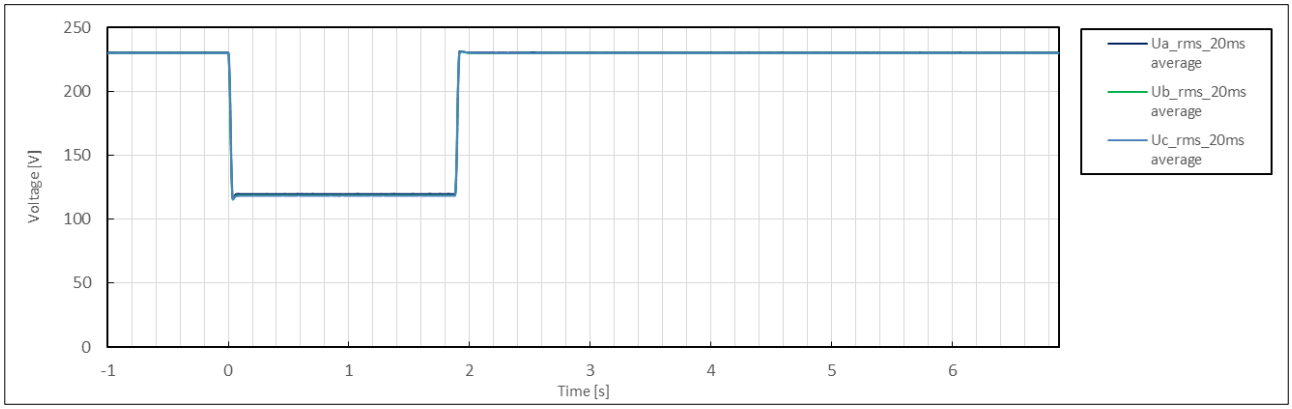


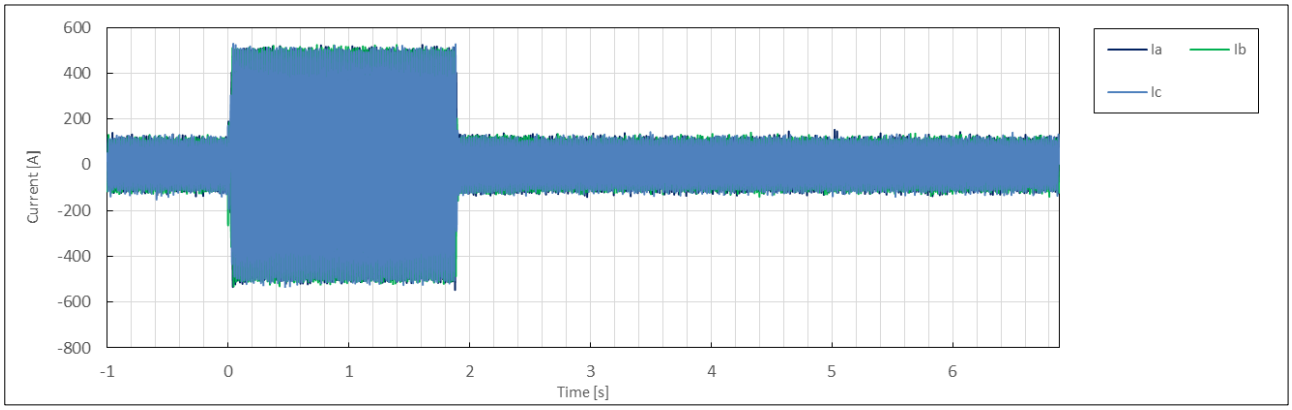


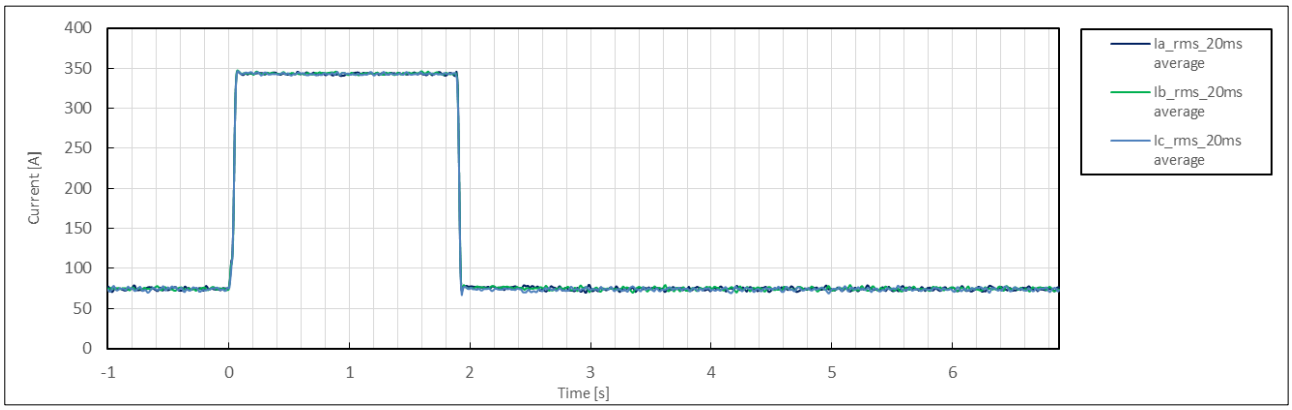
No. 3.2 Load Test

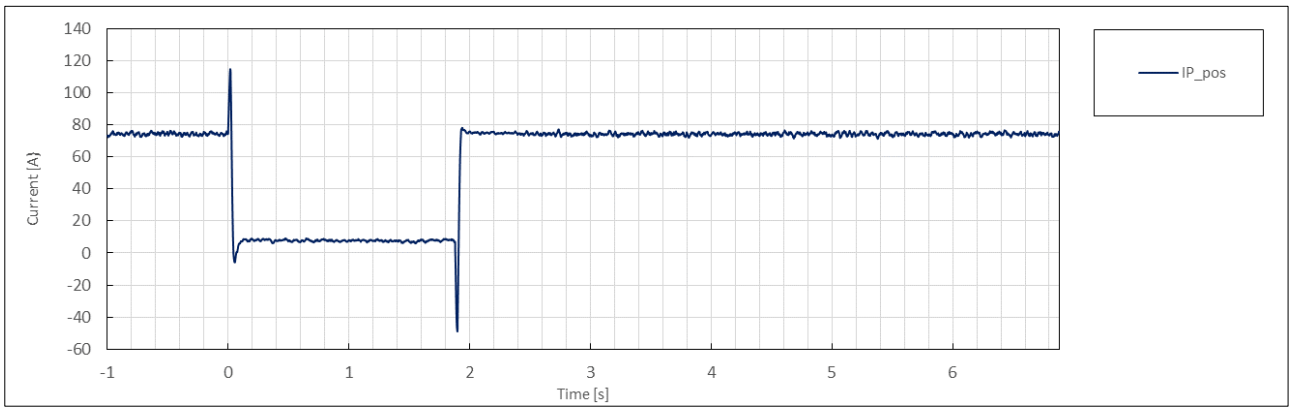


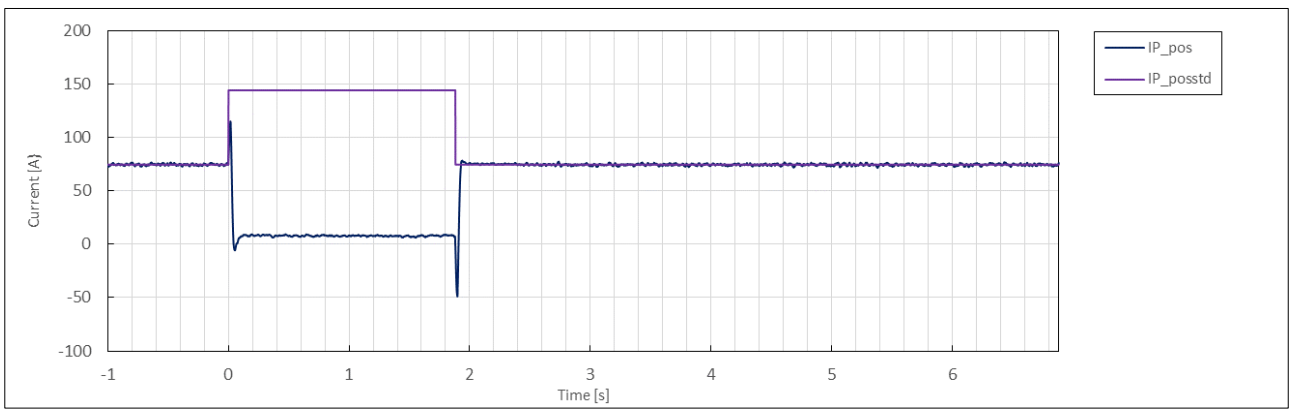


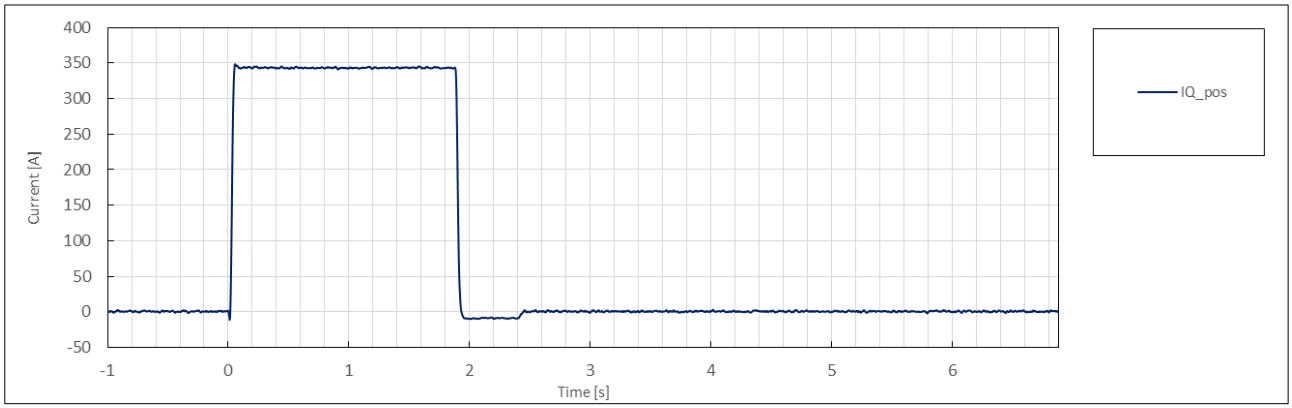


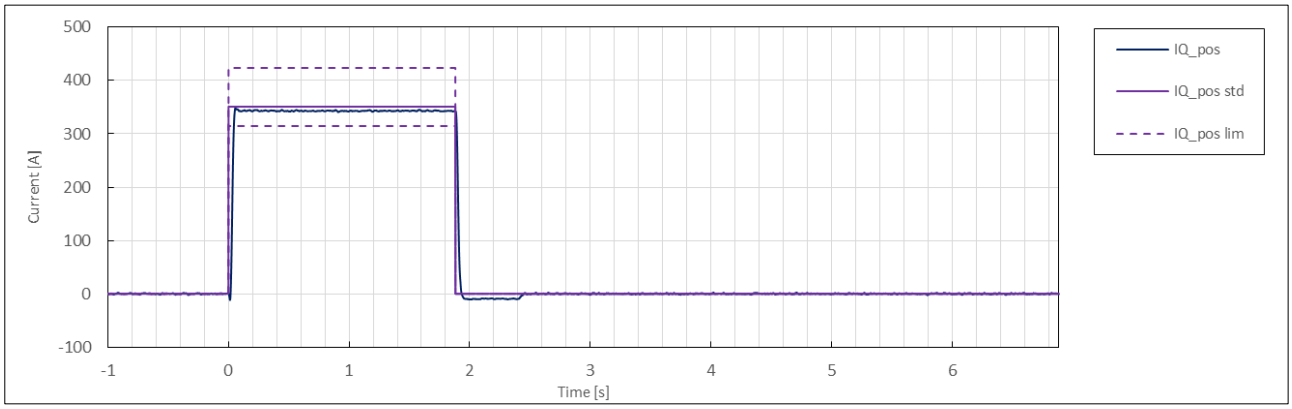

Current [A]
Time [s]
Ia
Ib
Ic

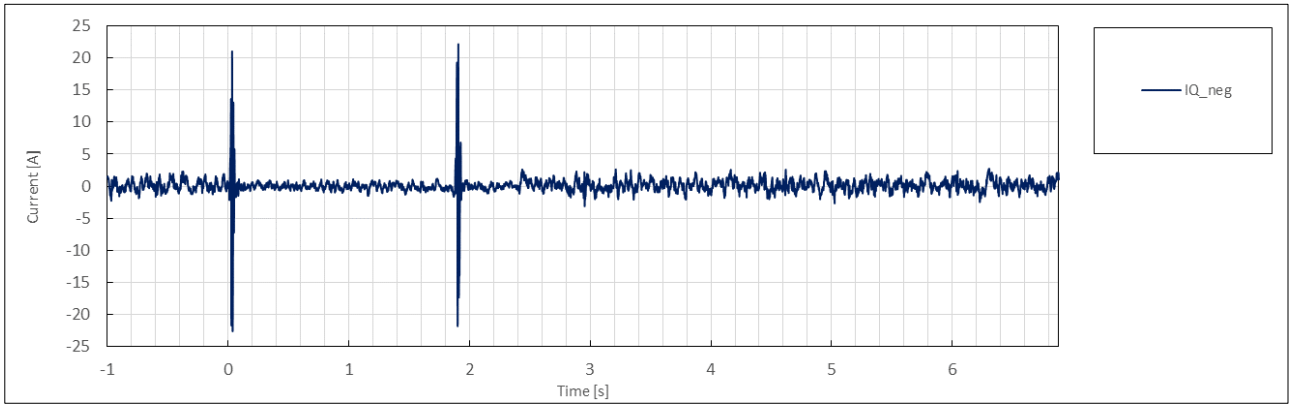

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

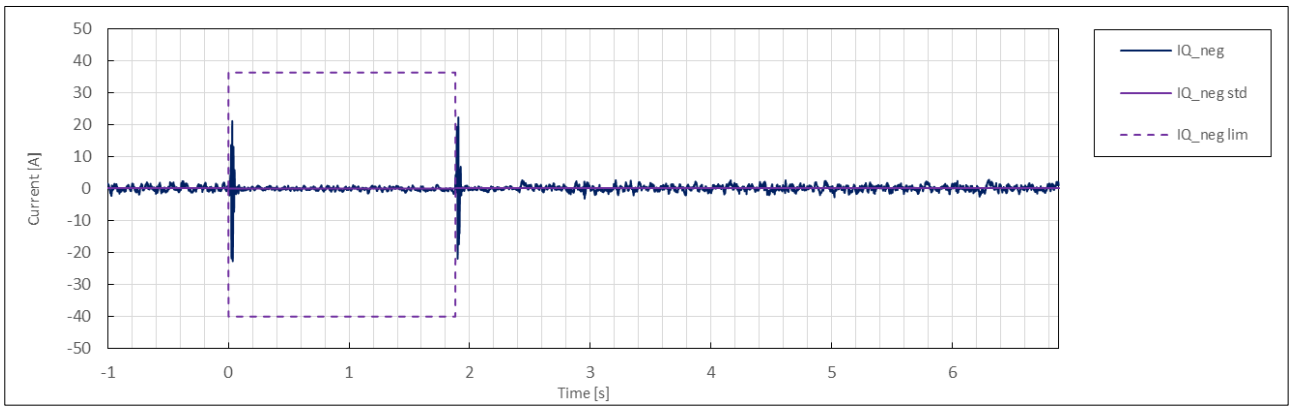

Current [A]
Time [s]
IP_pos

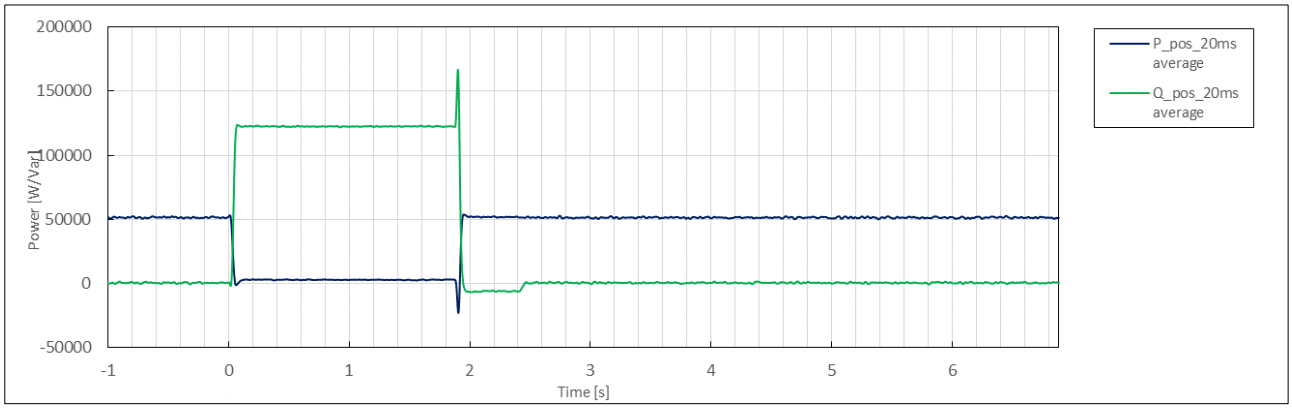

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

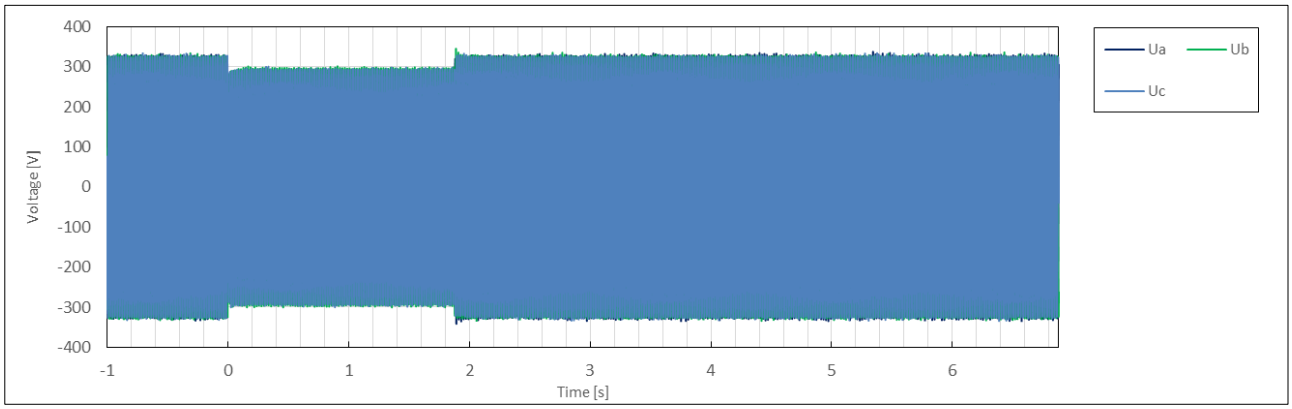

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

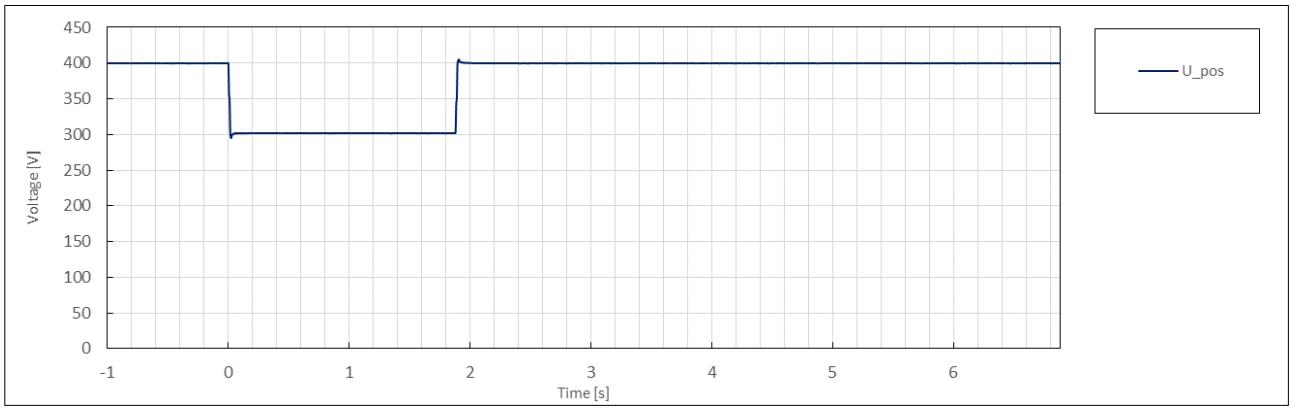

Current [A]
Time [s]
IQ_neg

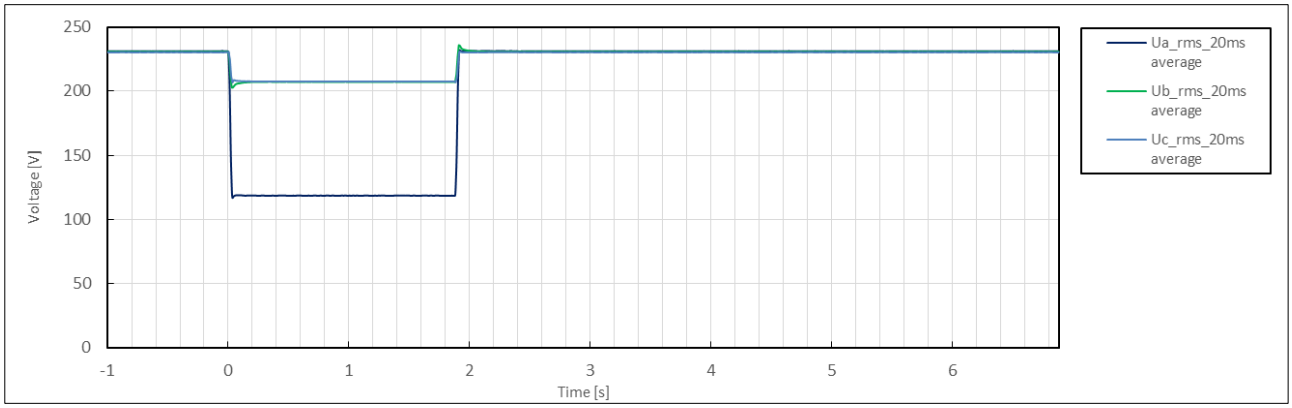

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
6
Time [s]
P_pos_20ms average
Q_pos_20ms average

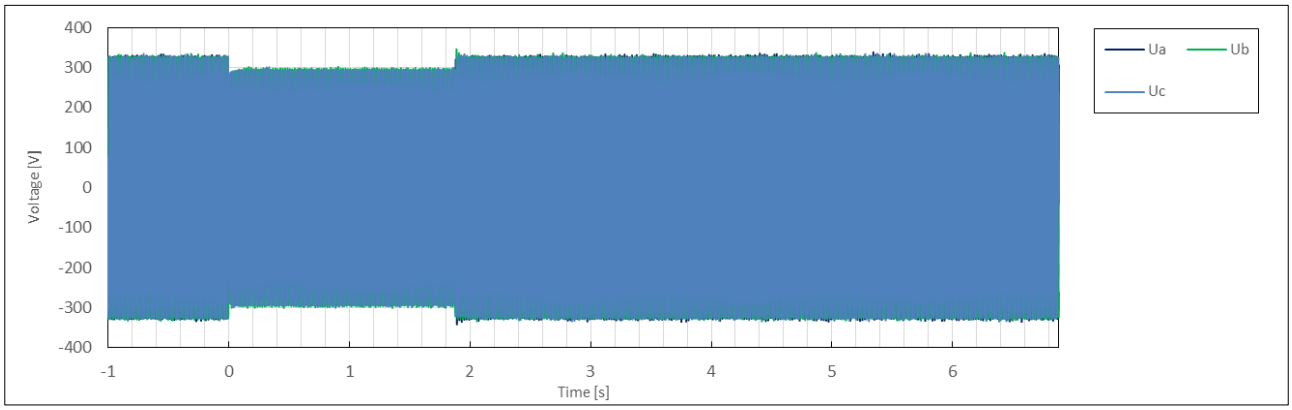
No. 3.3 Idle Test

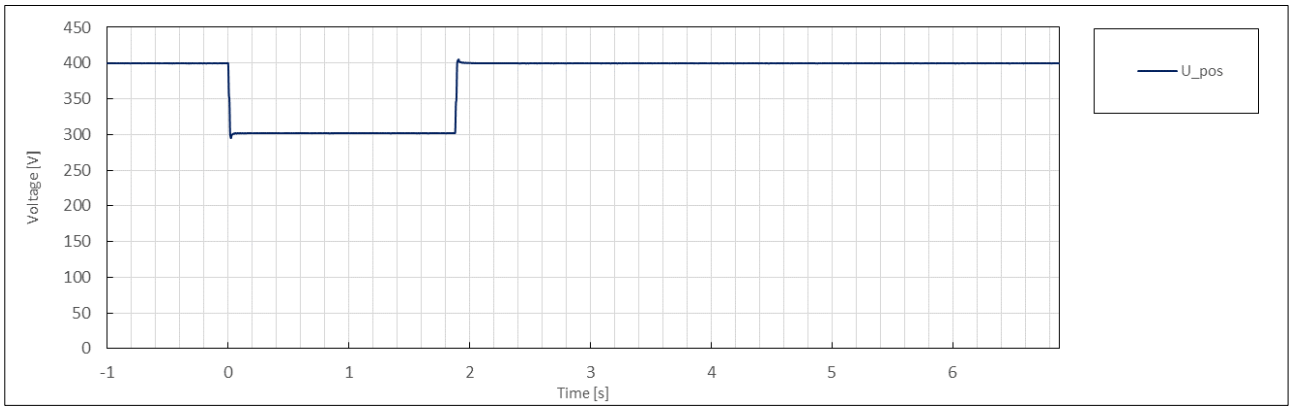


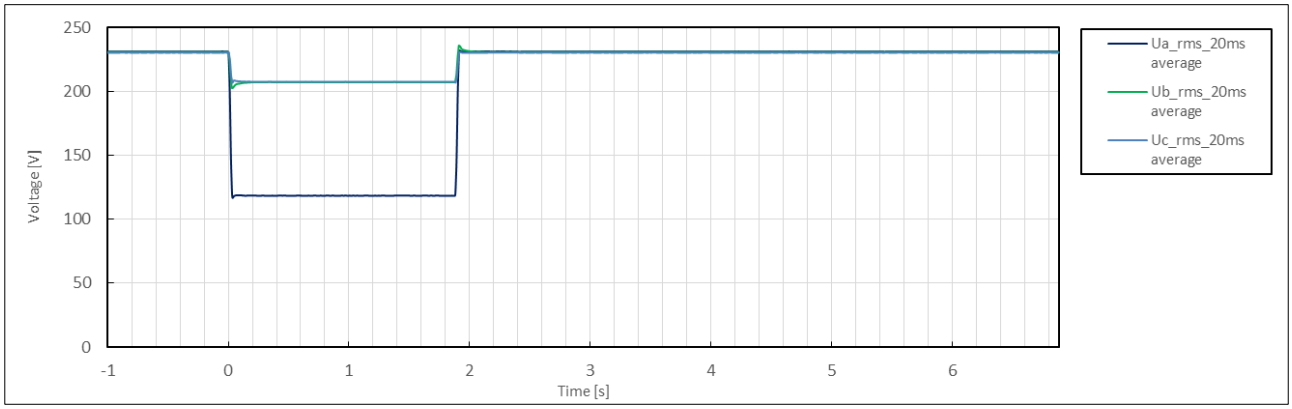


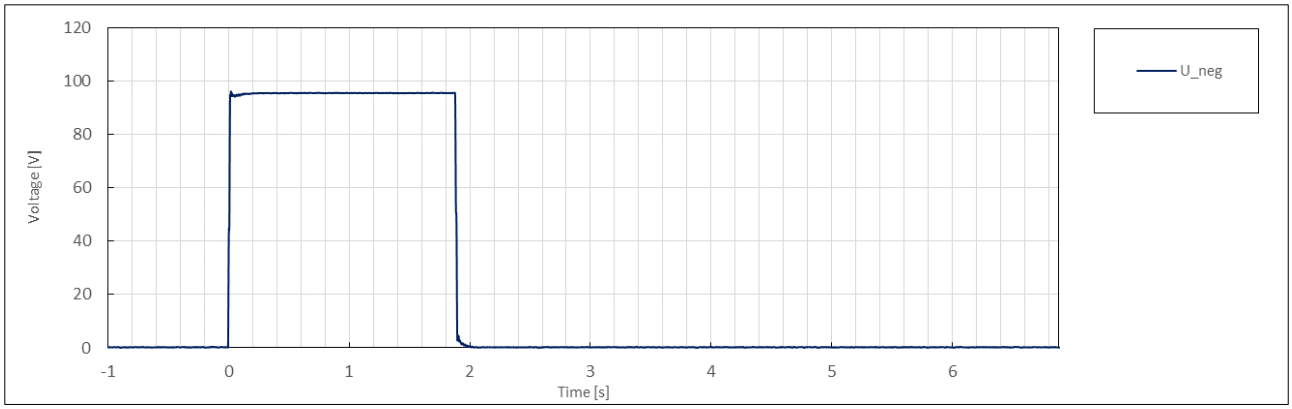


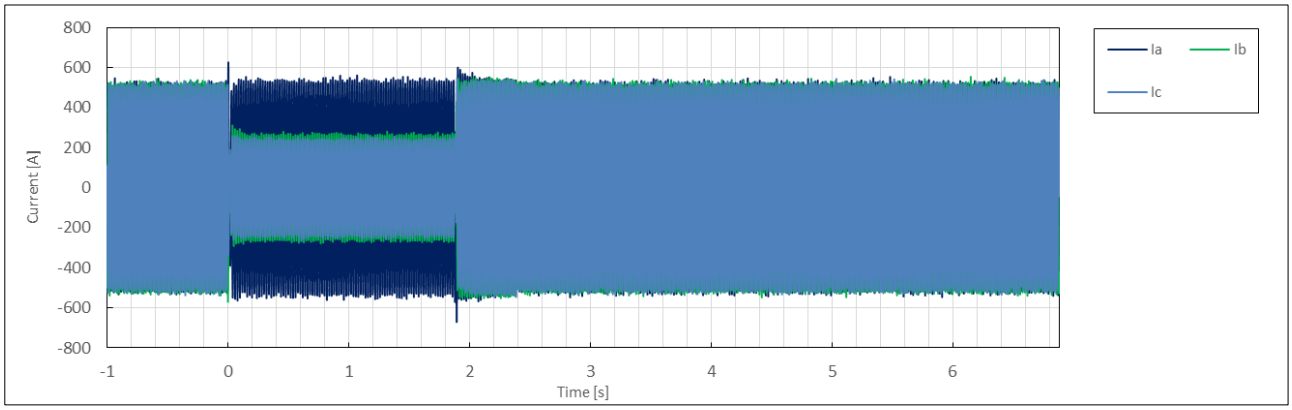
No. 3.3 Load Test

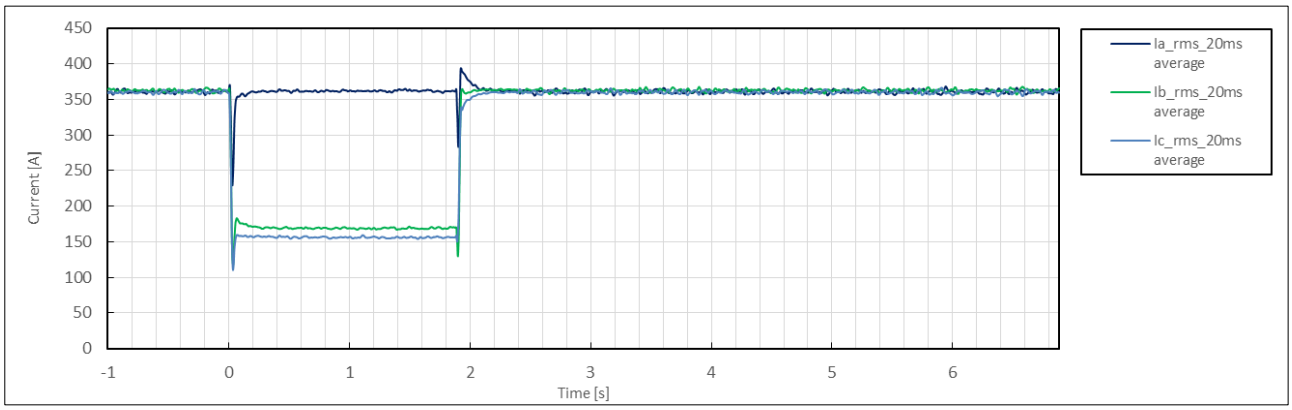


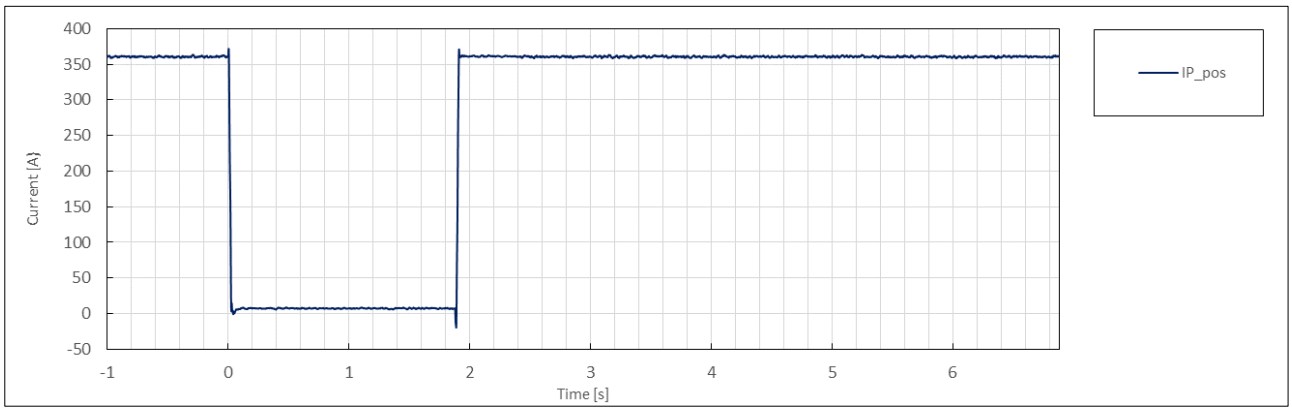


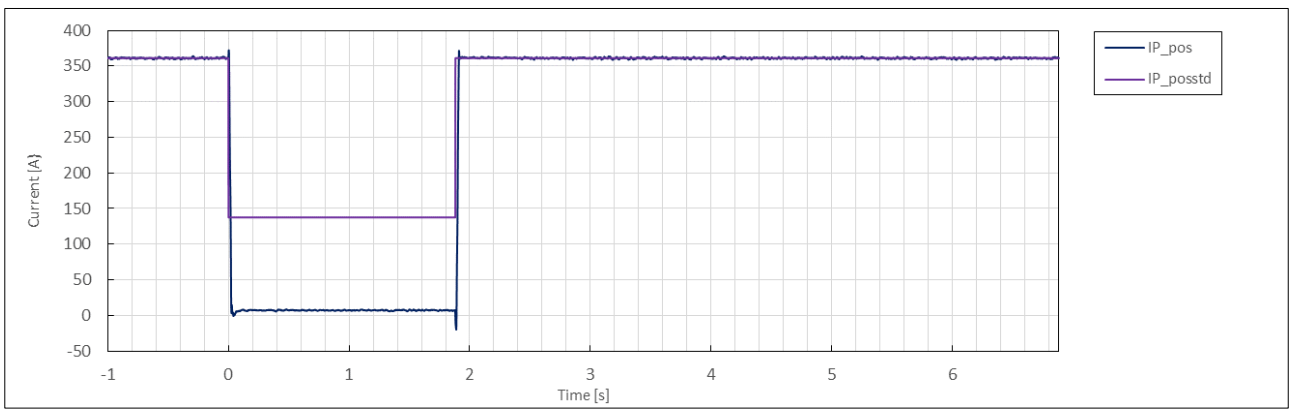


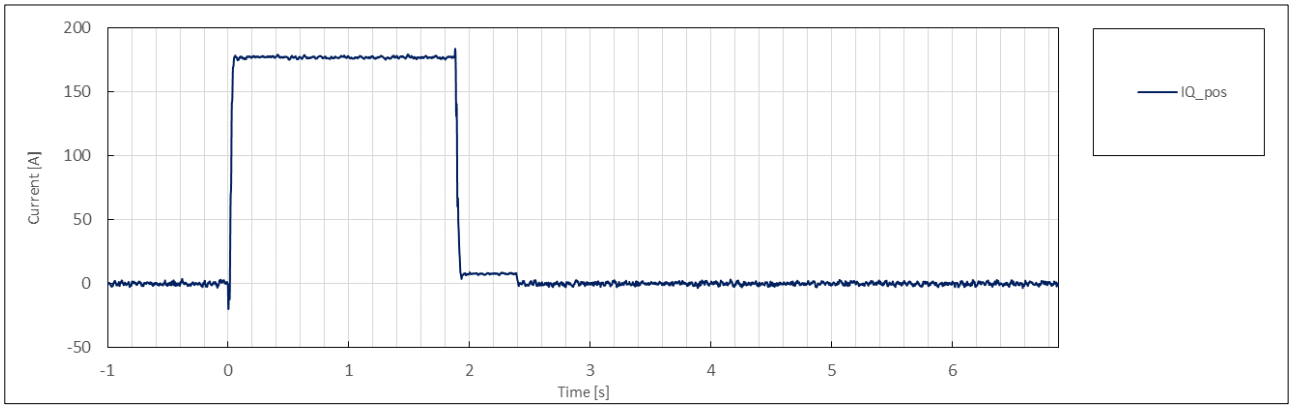


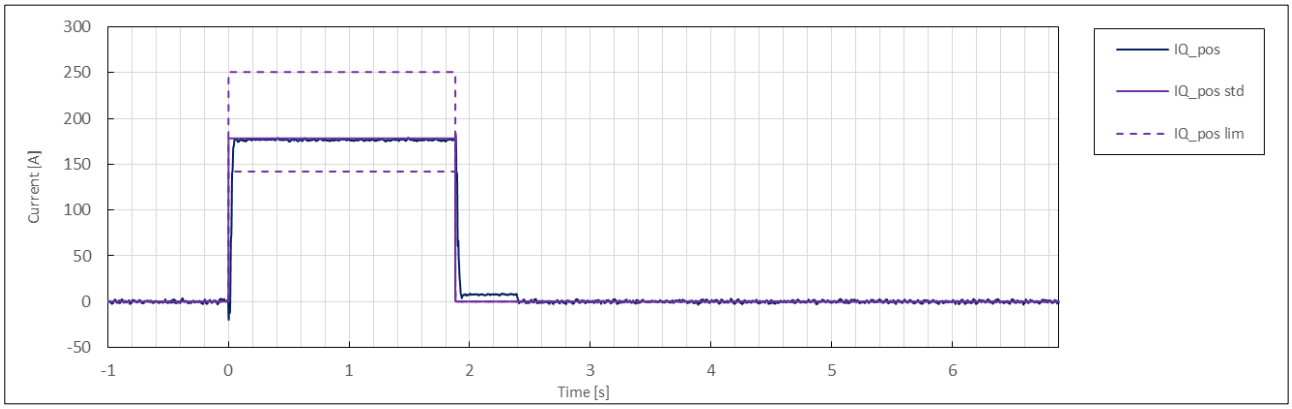

Current [A]
Time [s]
Ia
Ib
Ic

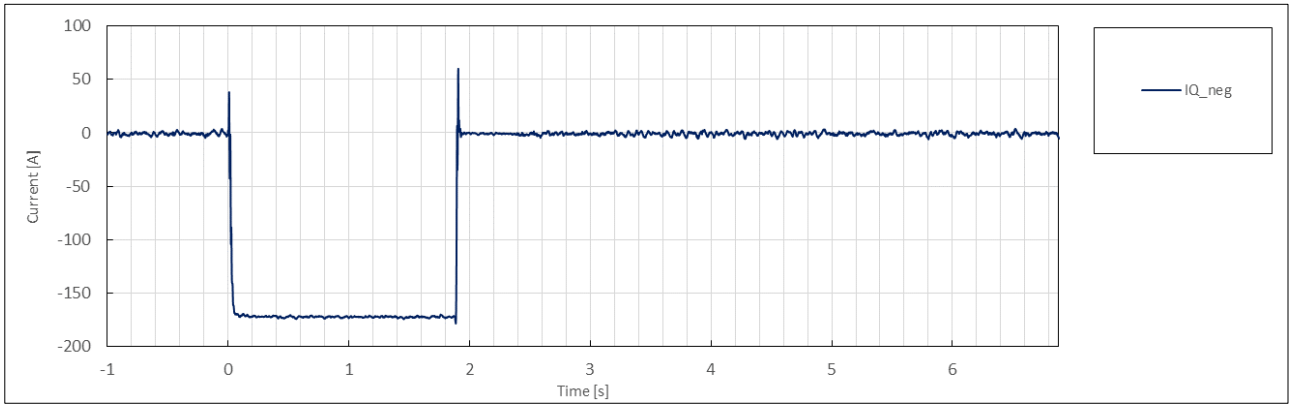

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

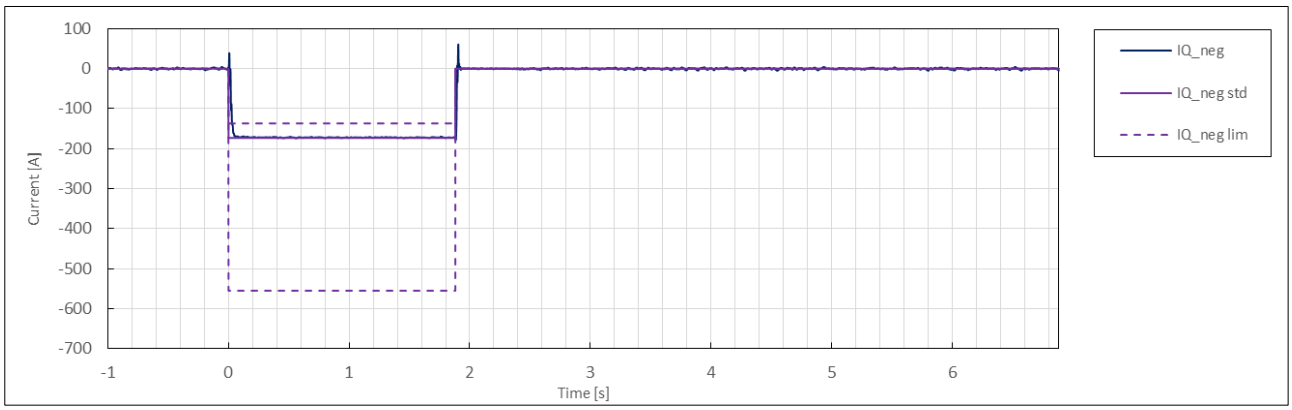

Current [A]
Time [s]
IP_pos

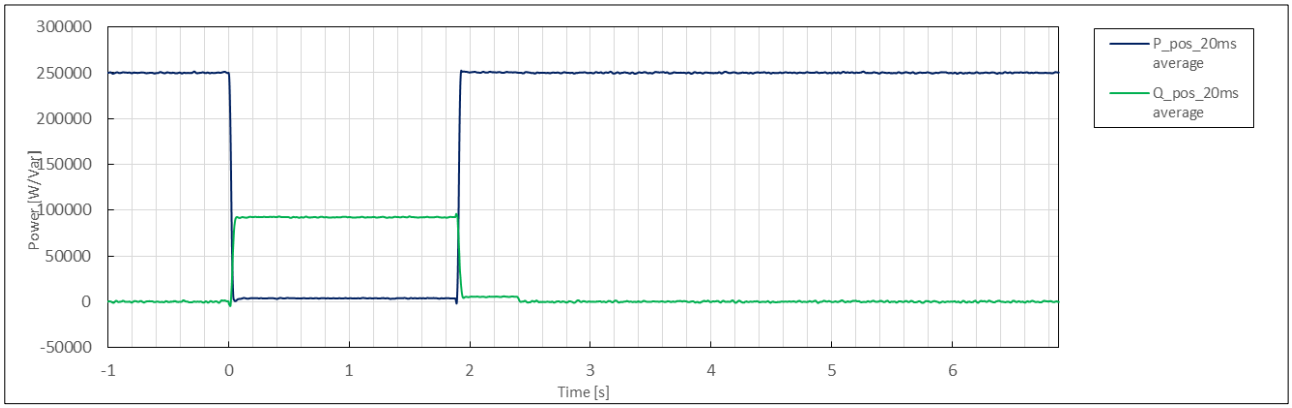

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

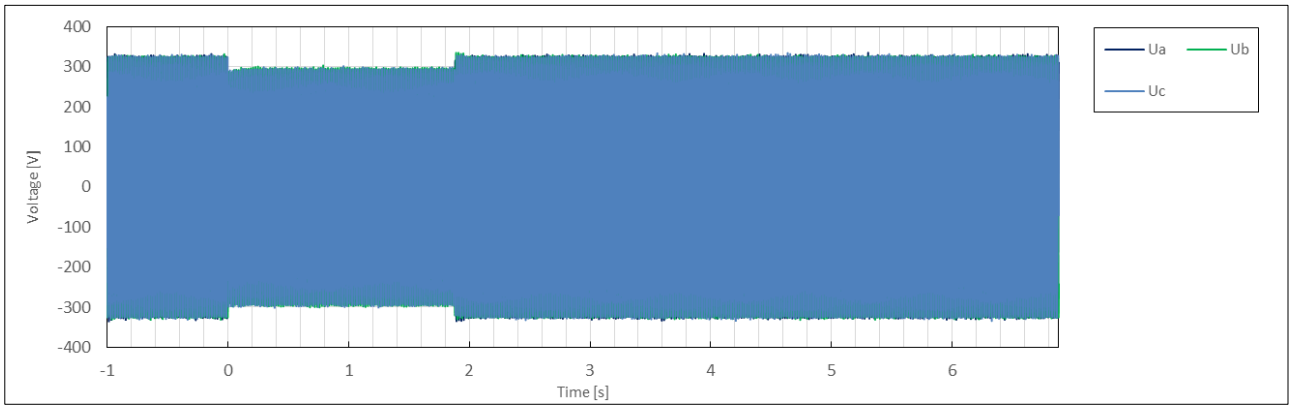

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

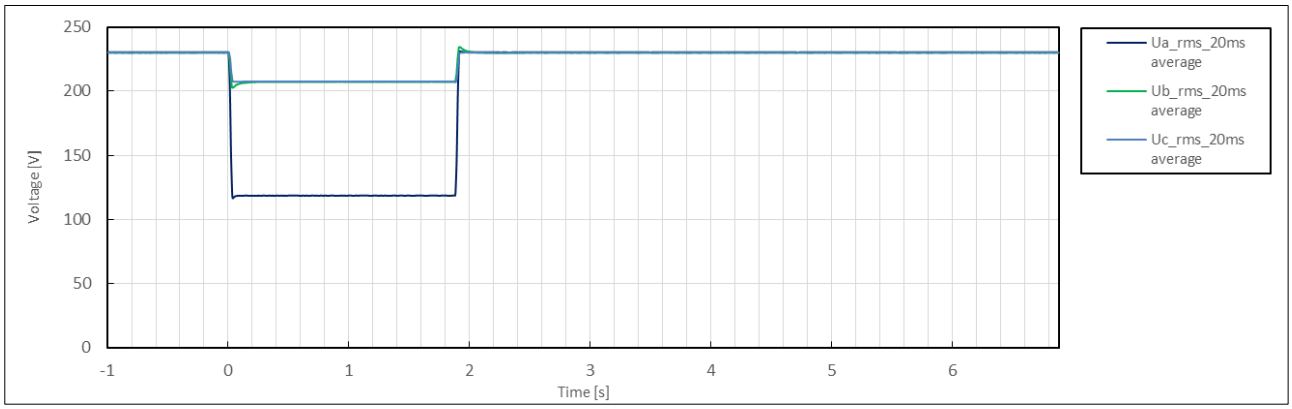

Current [A]
Time [s]
IQ_neg

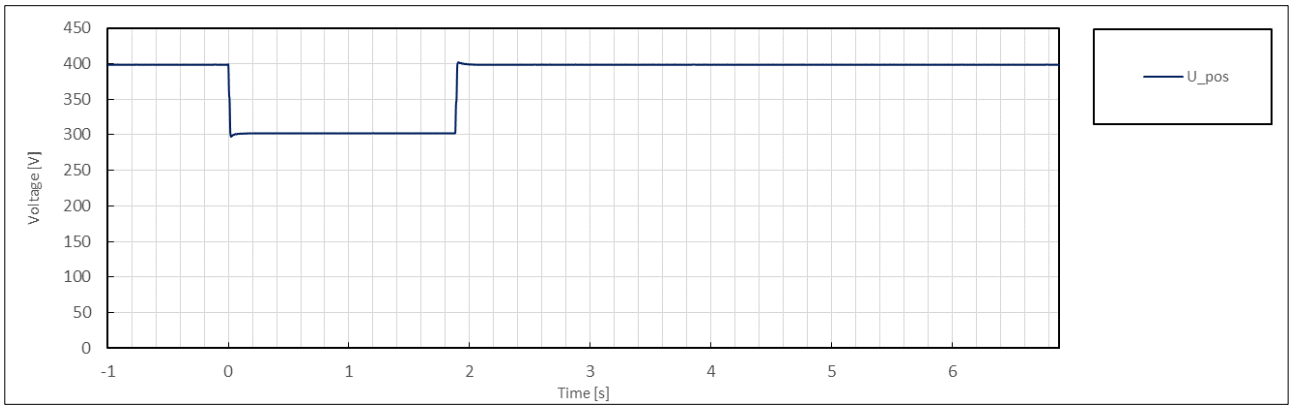

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
6
Time [s]
P_pos_20ms average
Q_pos_20ms average

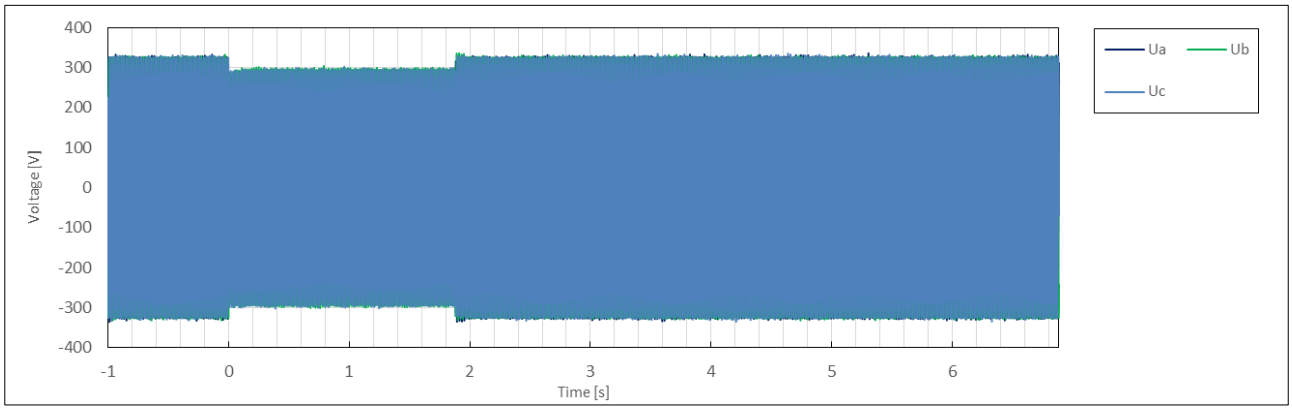
No. 3.4 Idle Test

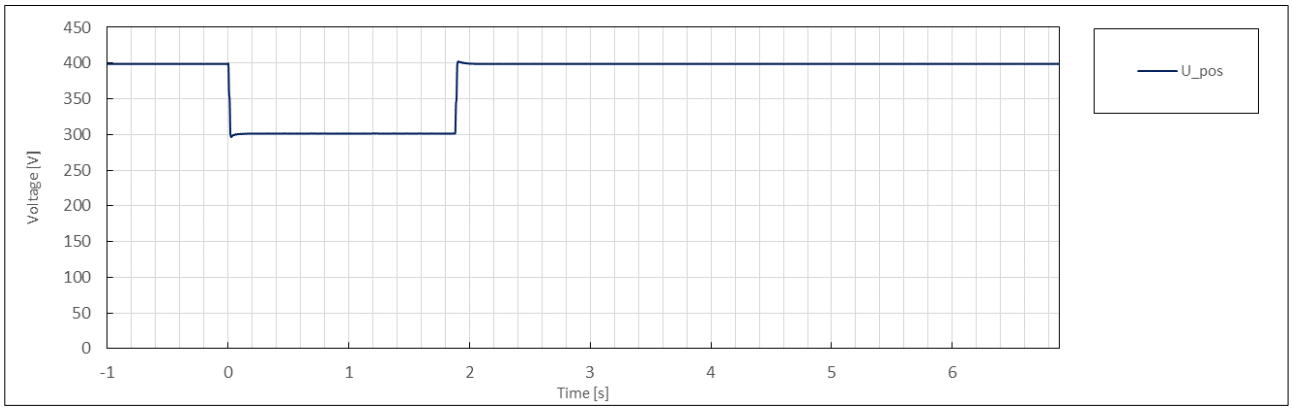


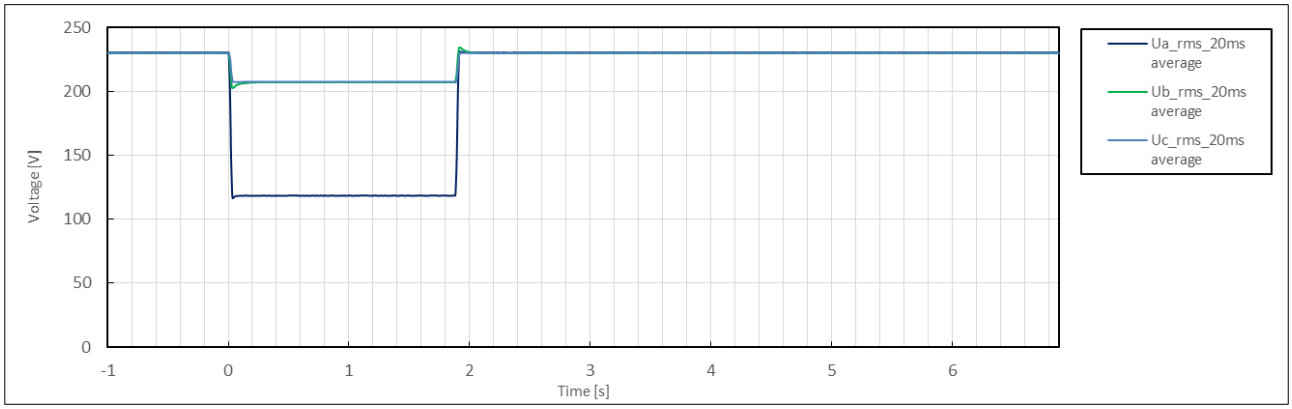


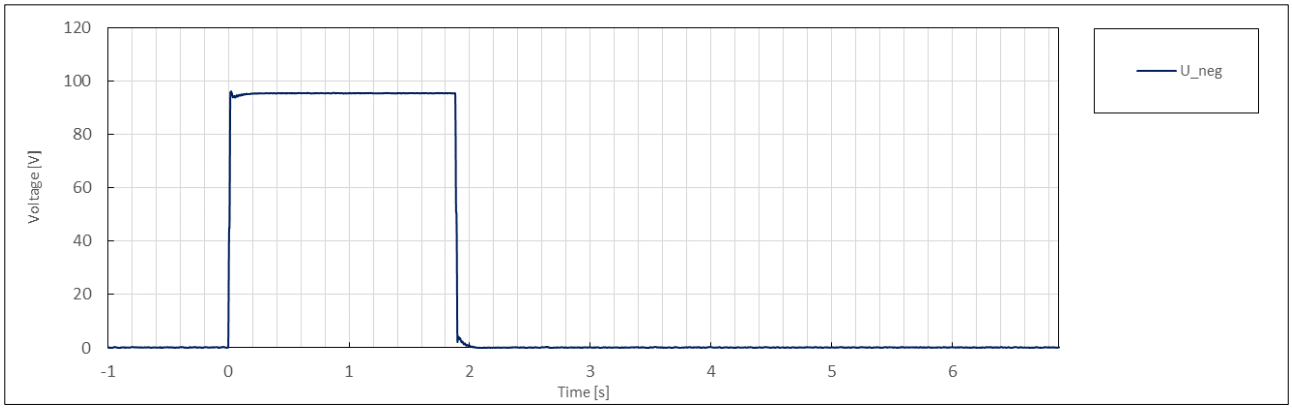


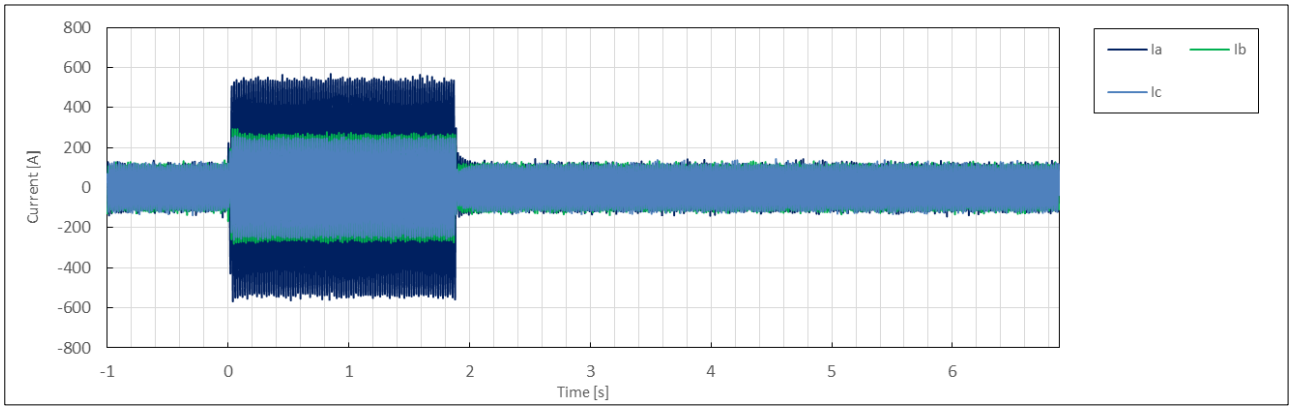
No. 3.4 Load Test

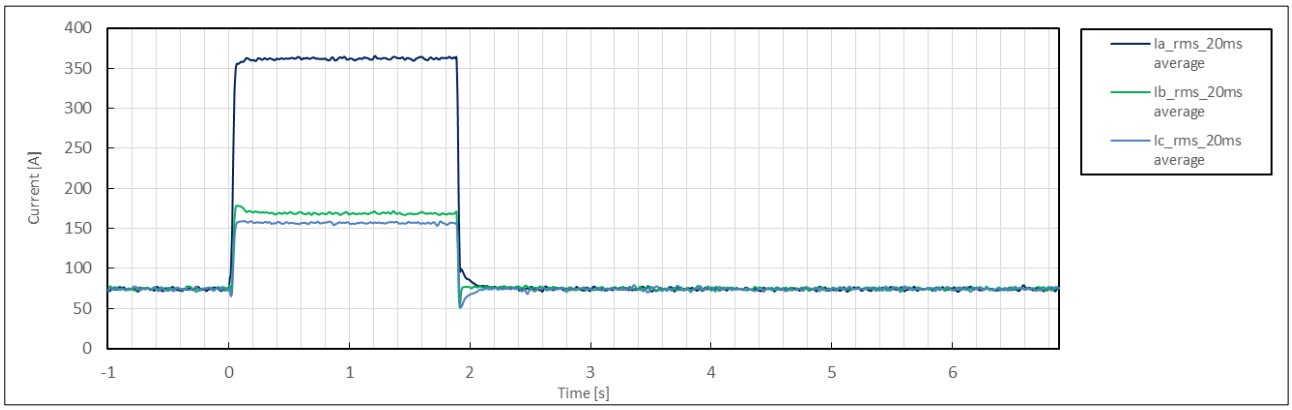


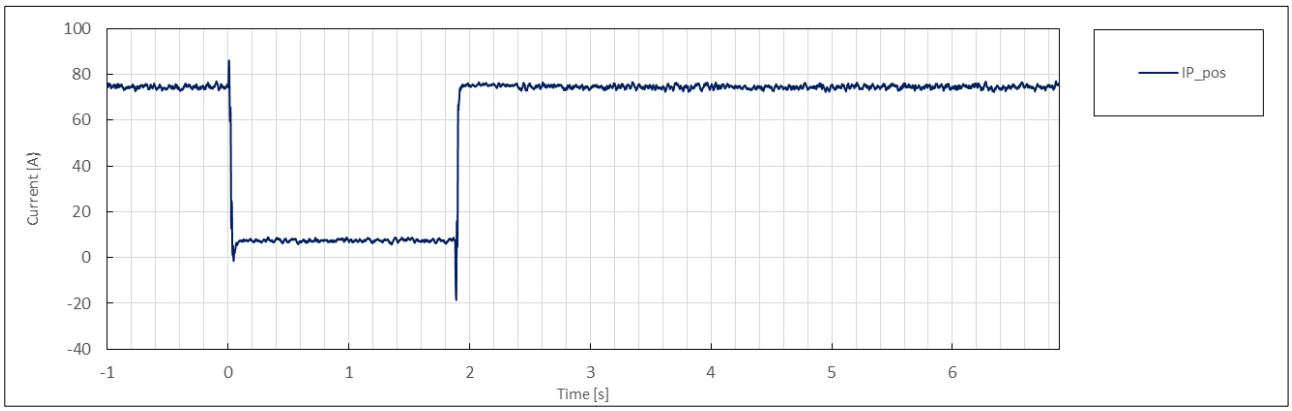


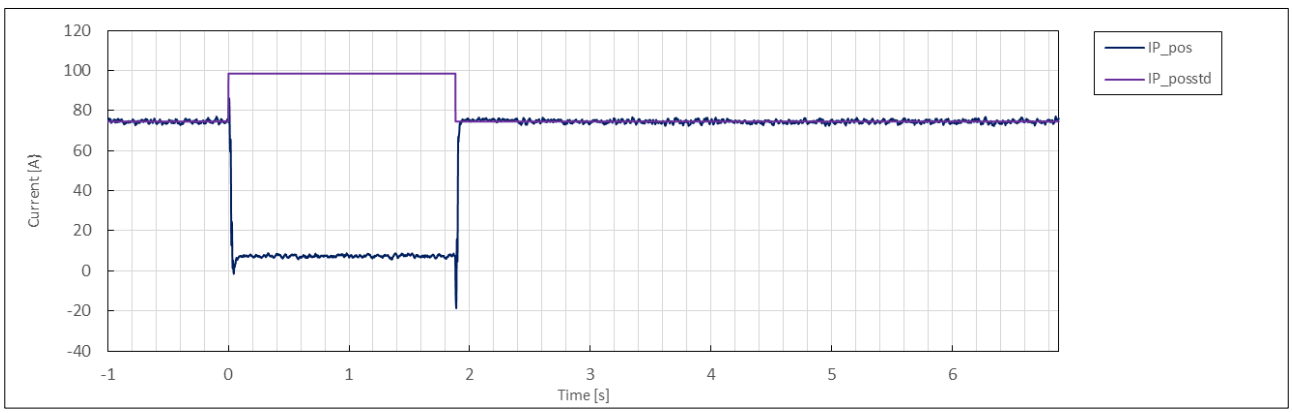


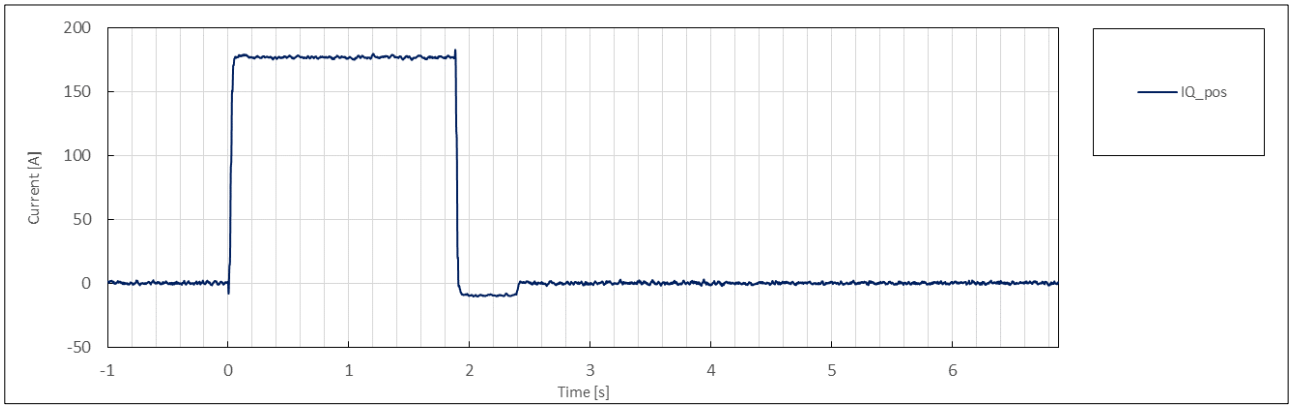


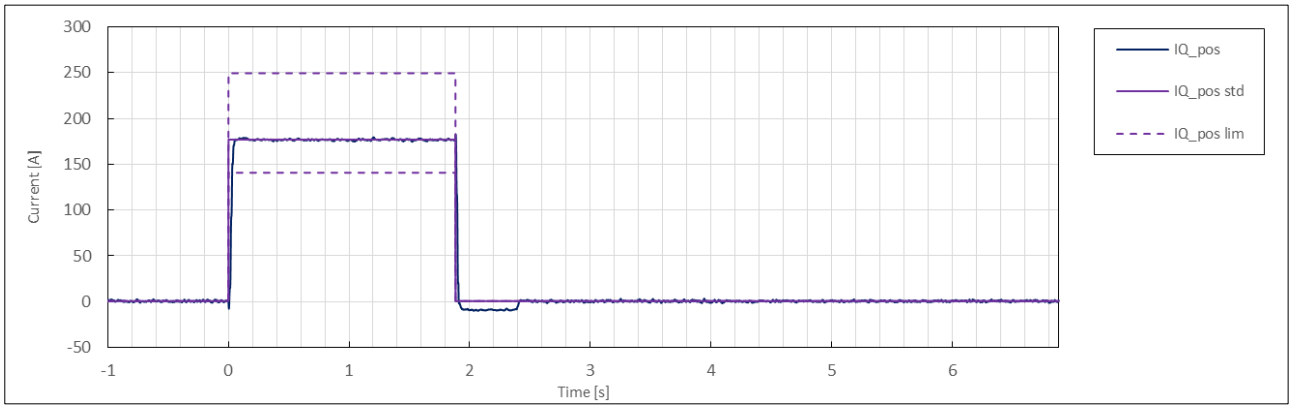

Current [A]
Time [s]
Ia
Ib
Ic

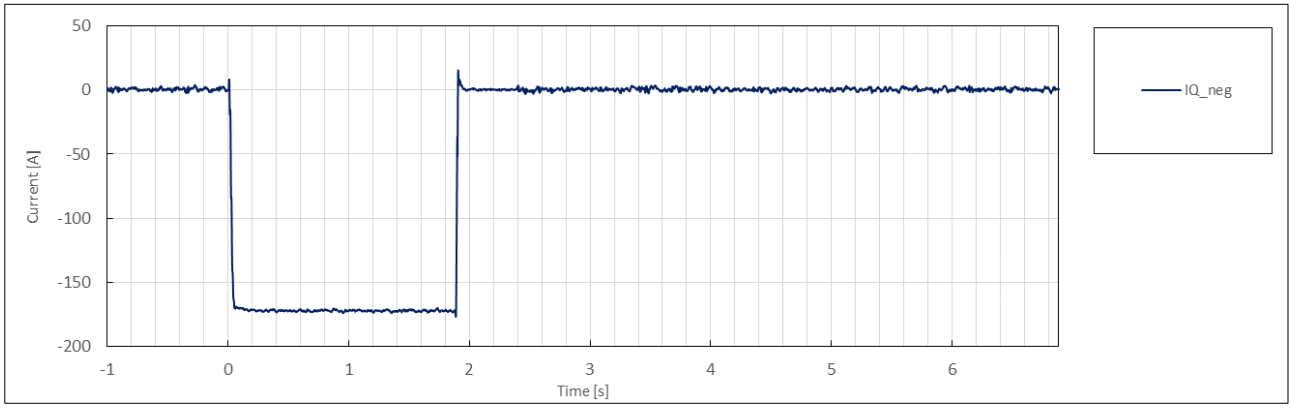

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

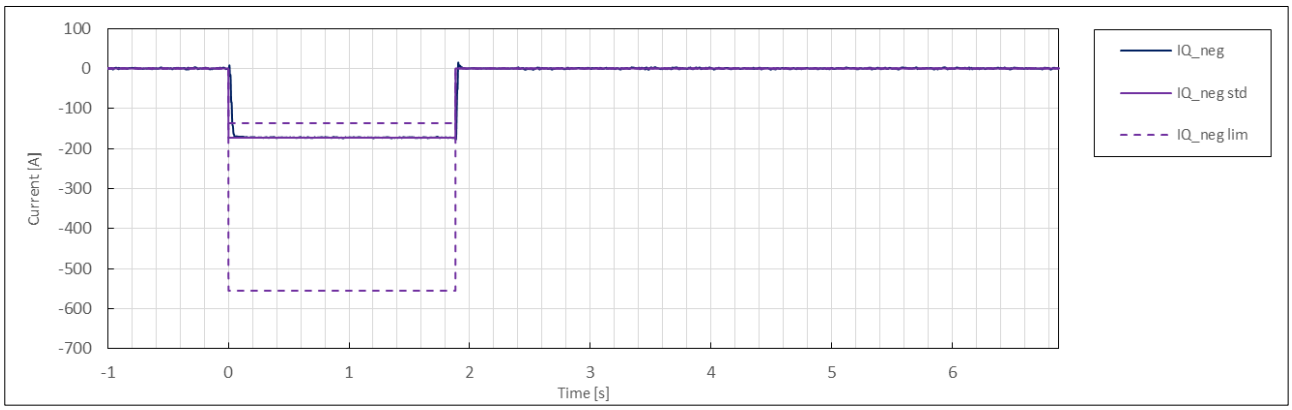

Current [A]
Time [s]
IP_pos

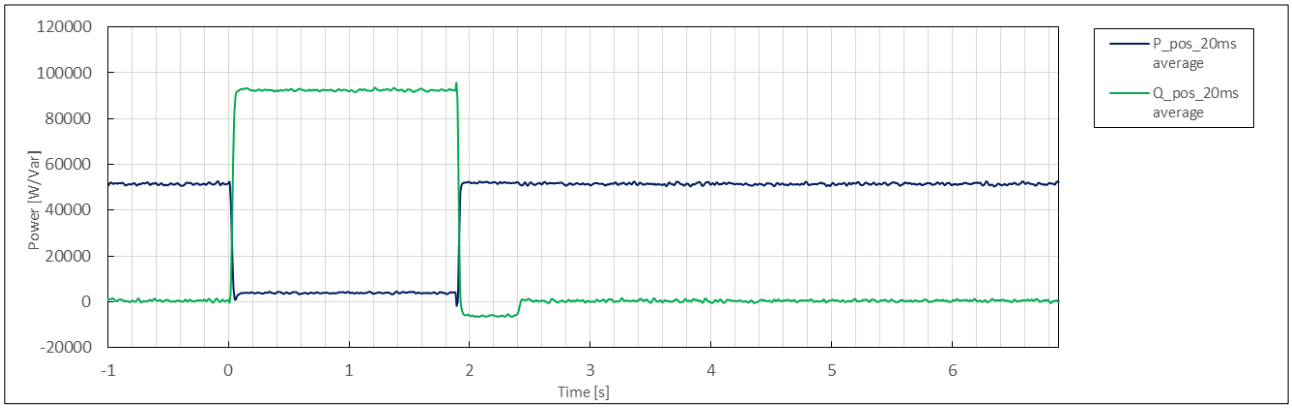

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

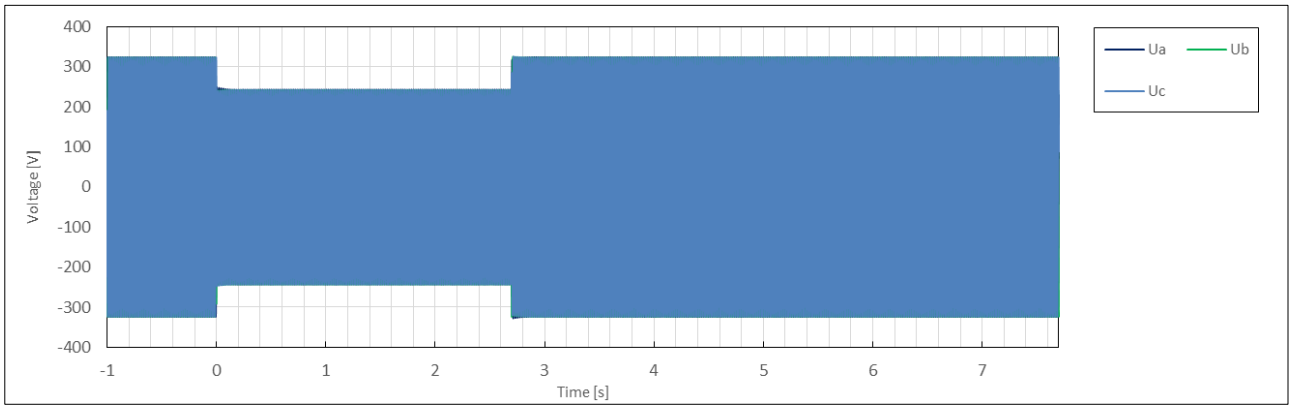

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

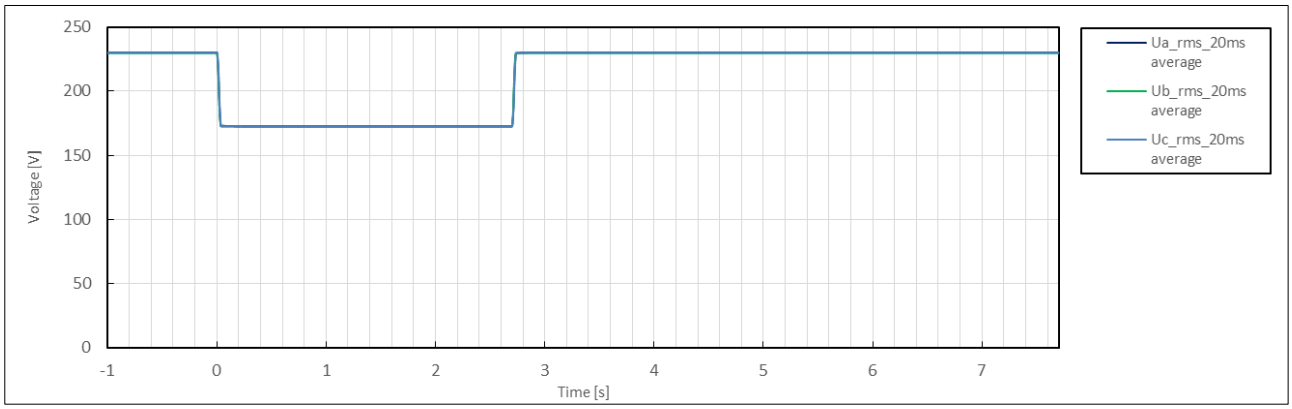

Current [A]
Time [s]
IQ_neg

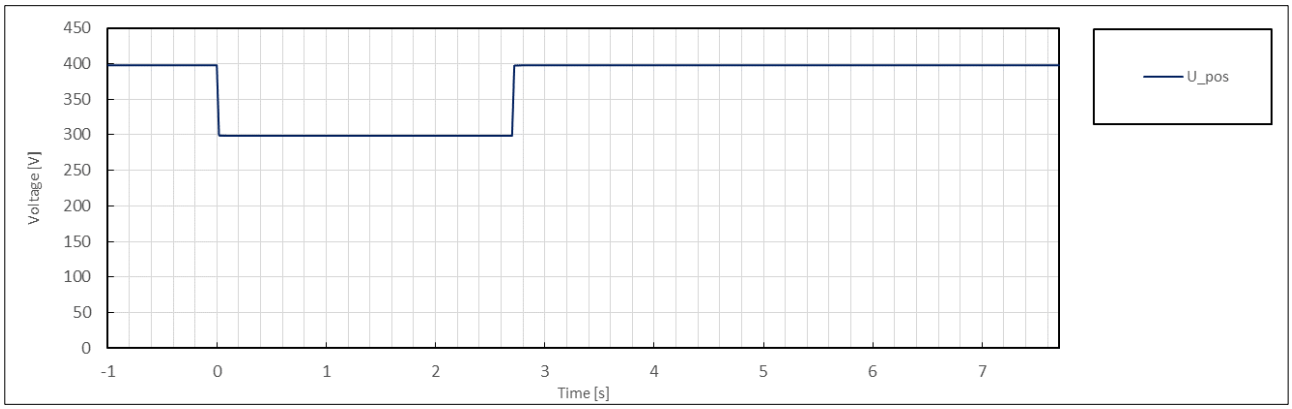

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


120000
100000
80000
60000
40000
20000
0
-20000
Power [W/Var]
-1
0
1
2
3
4
5
6
Time [s]
P_pos_20ms average
Q_pos_20ms average

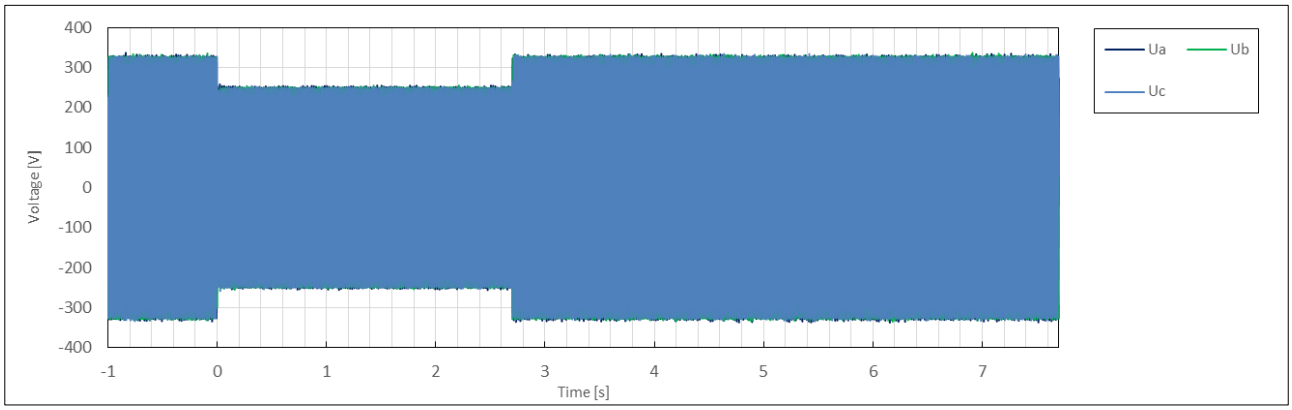
No. 4.1 Idle Test

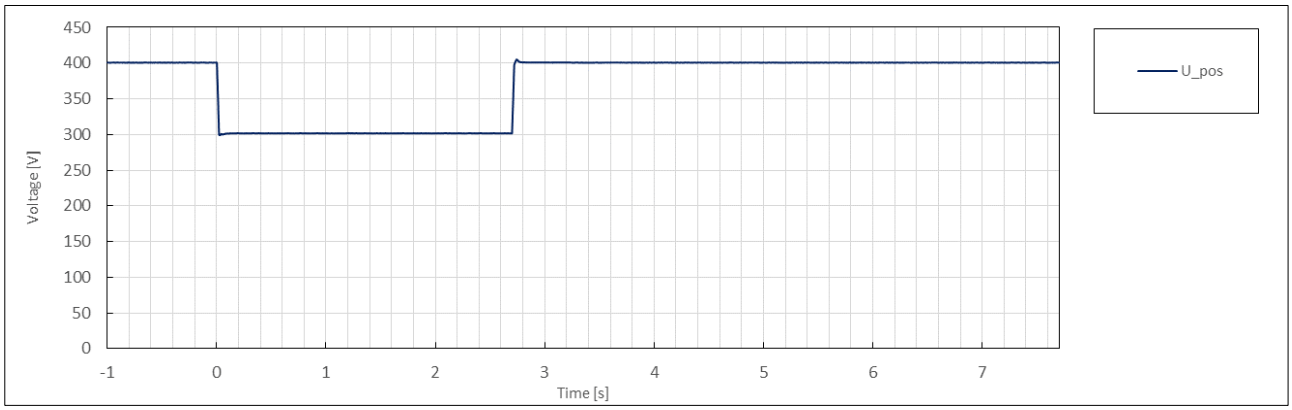


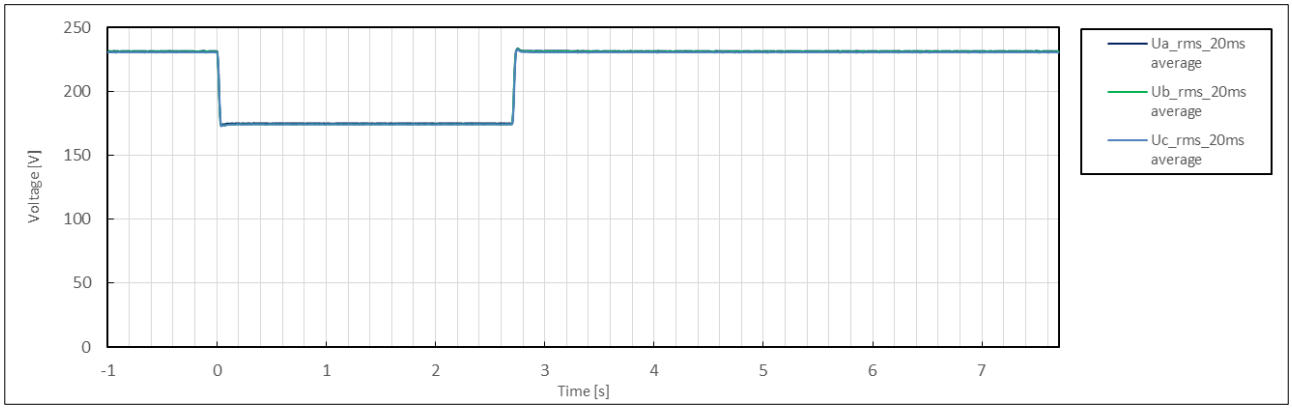


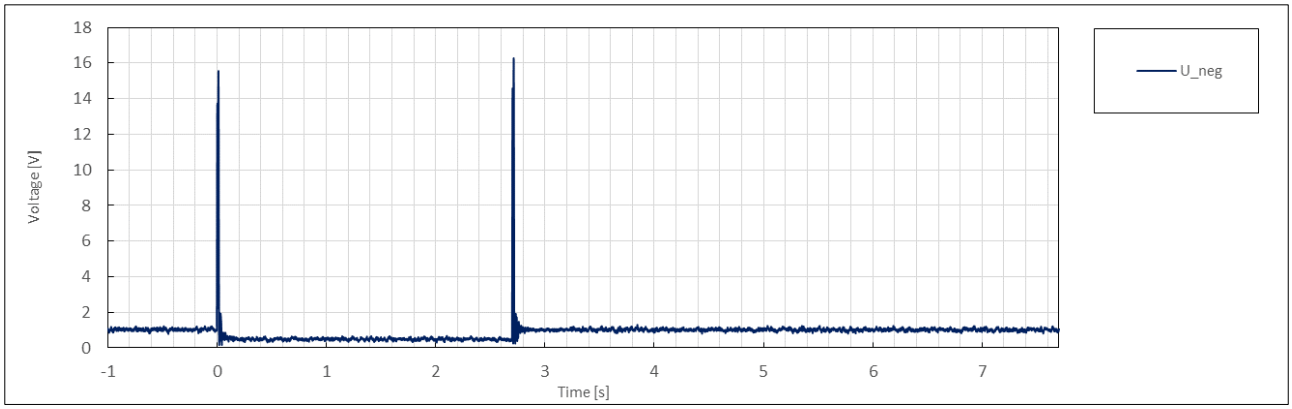


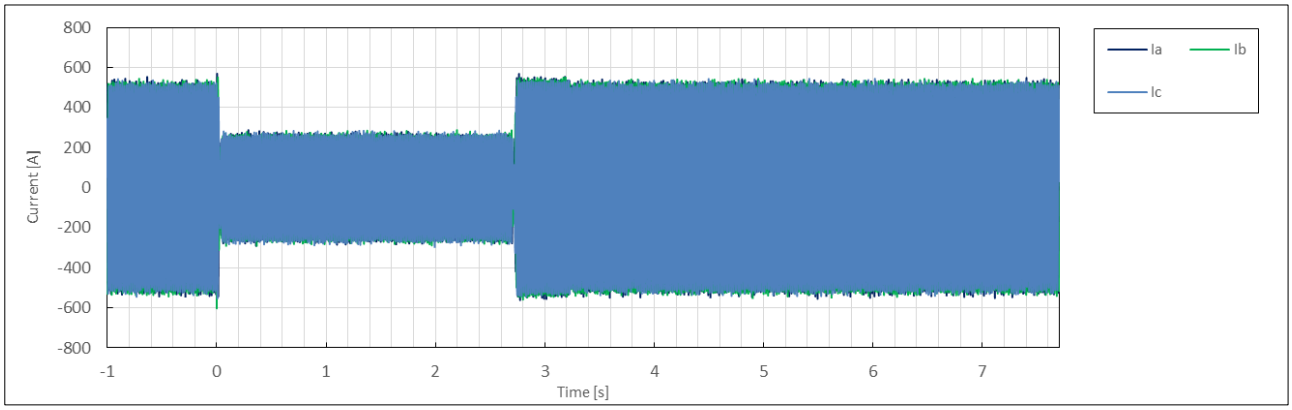
No. 4.1 Load Test

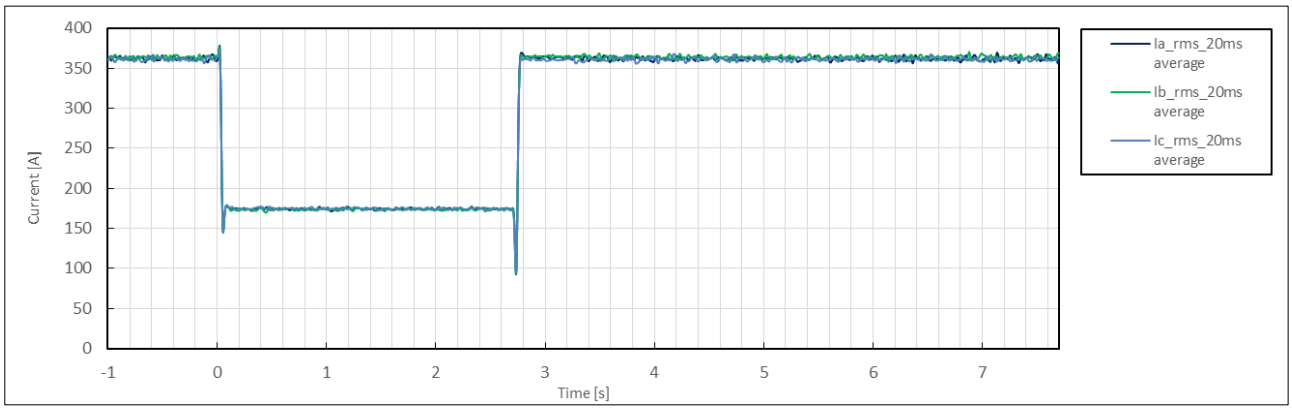


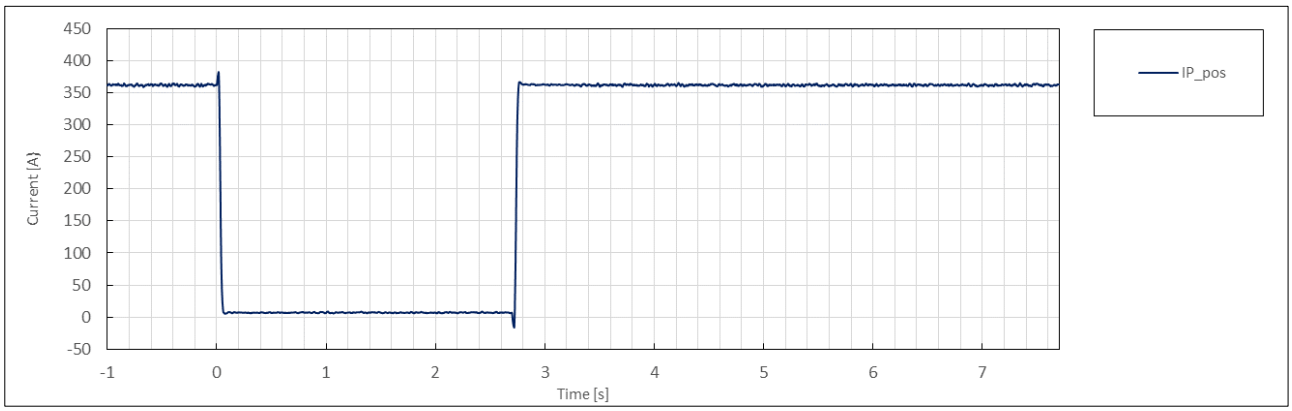


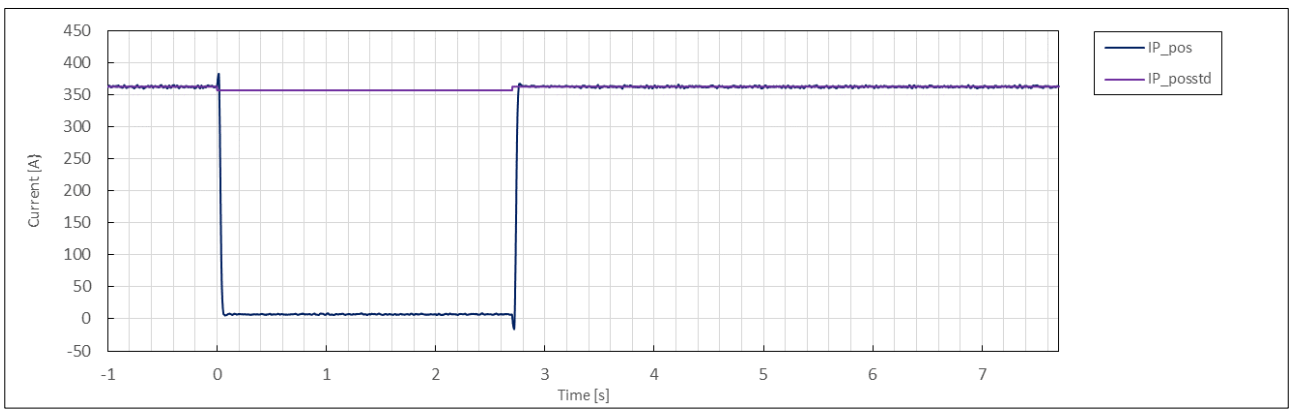


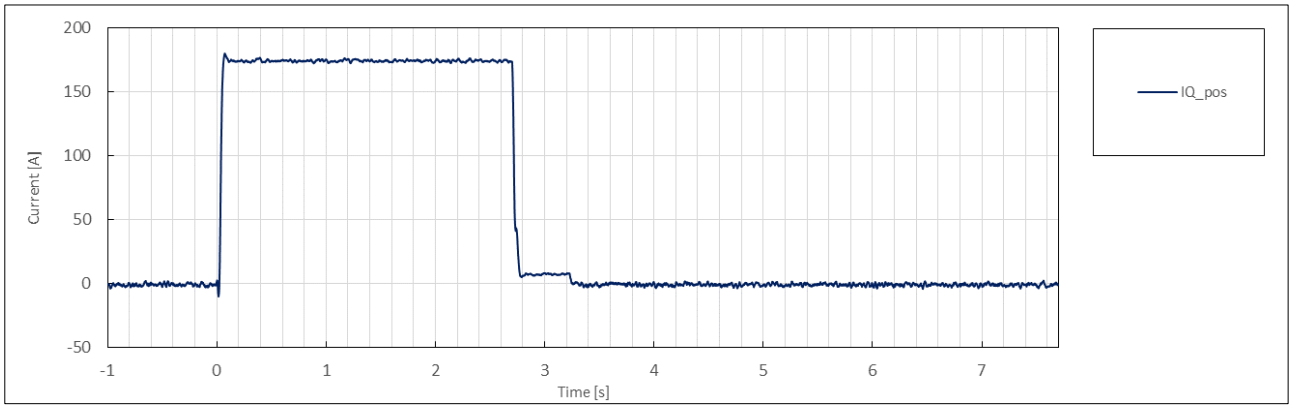


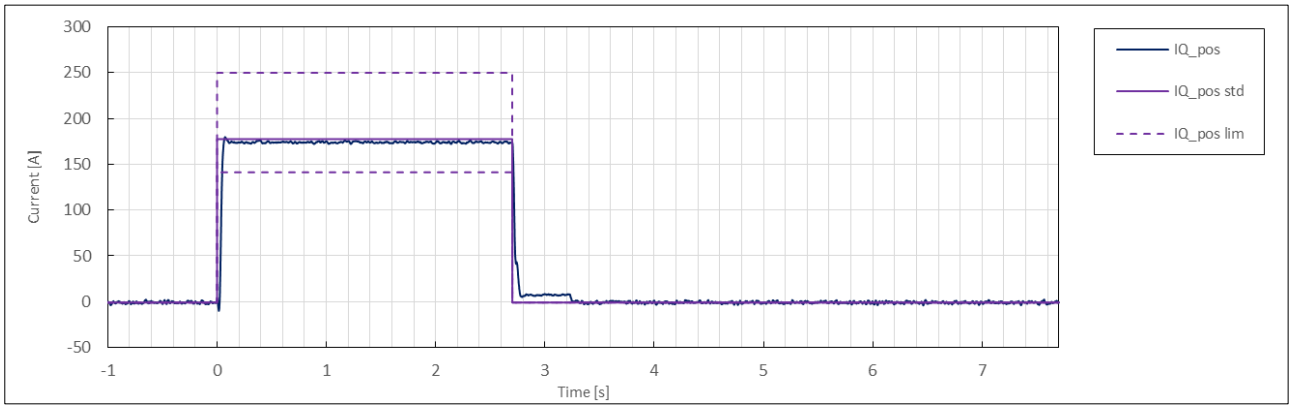

Current [A]
Time [s]
Ia
Ib
Ic

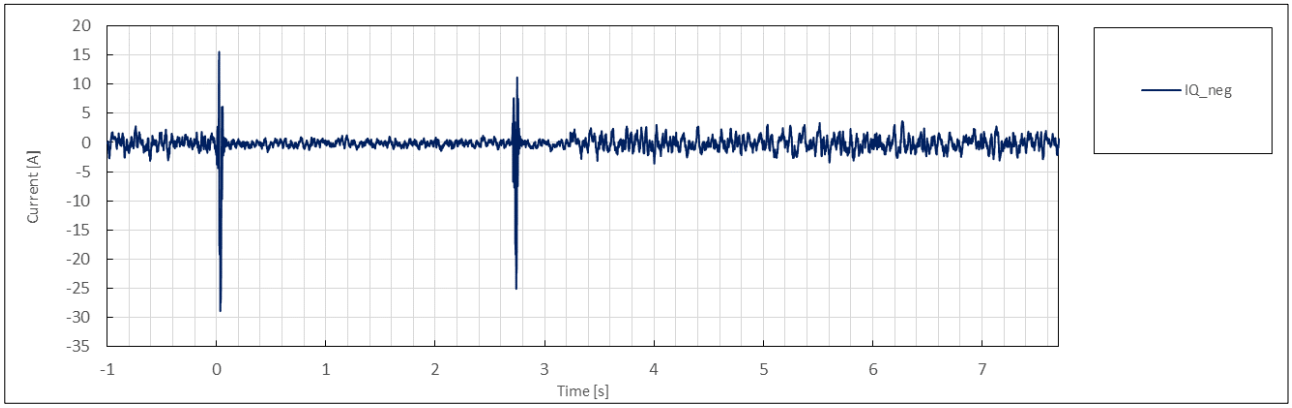

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

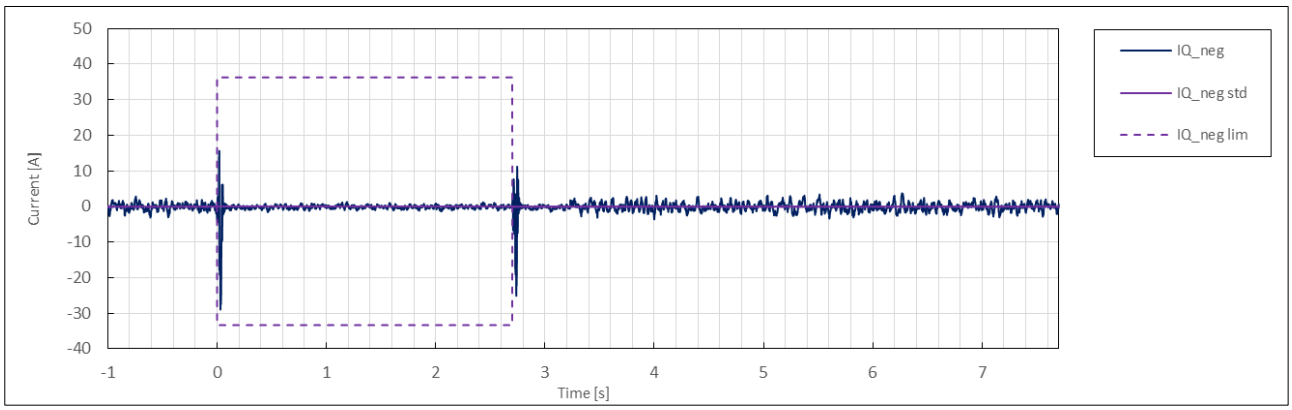

Current [A]
Time [s]
IP_pos

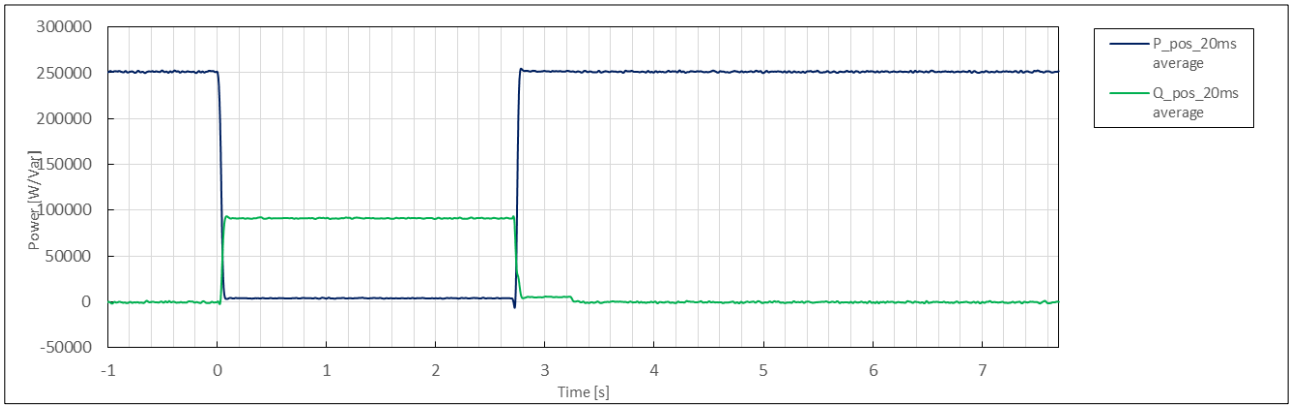

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

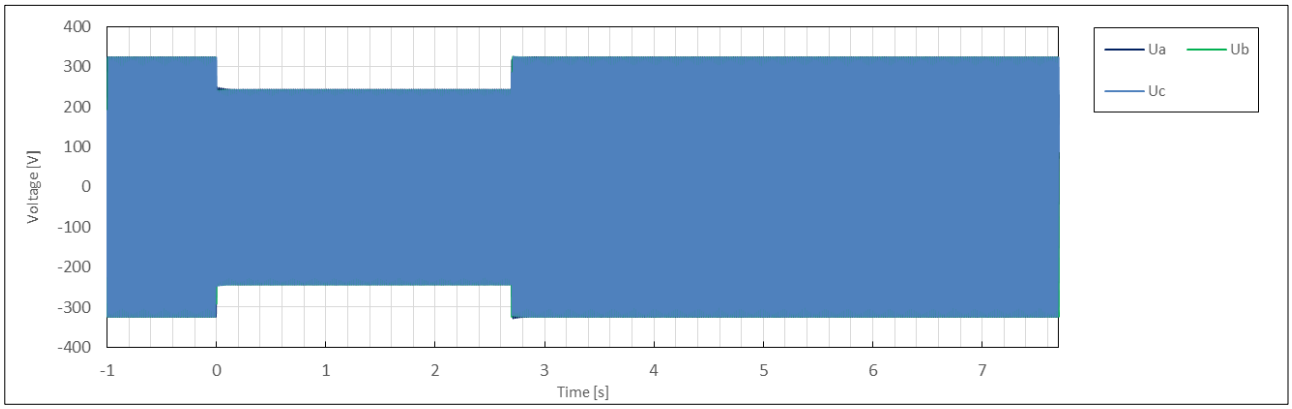

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

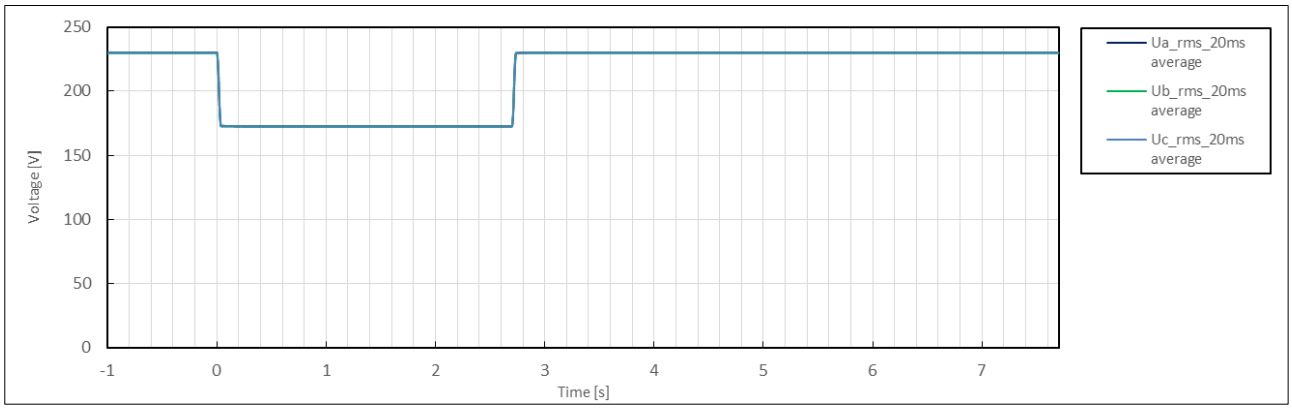

Current [A]
Time [s]
IQ_neg

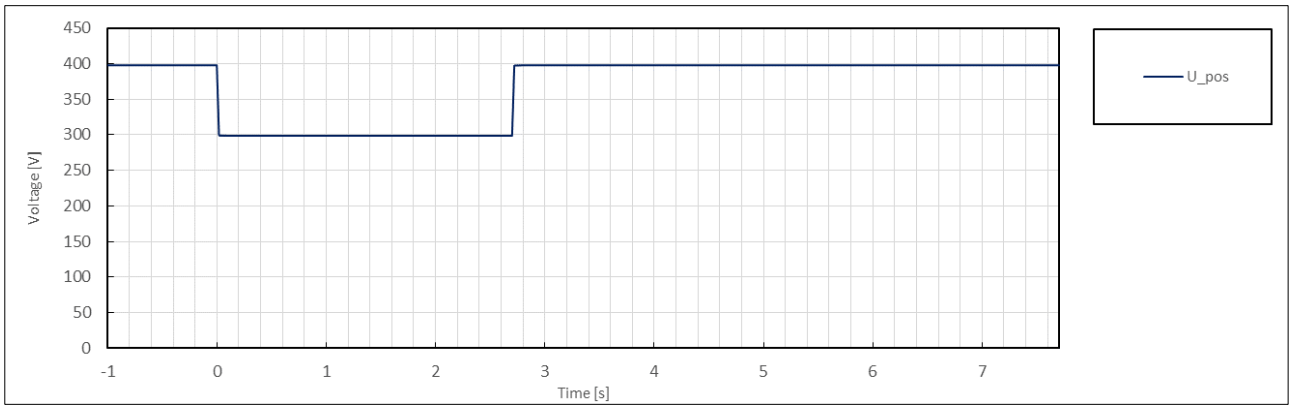

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
Time [s]
P_pos_20ms average
Q_pos_20ms average

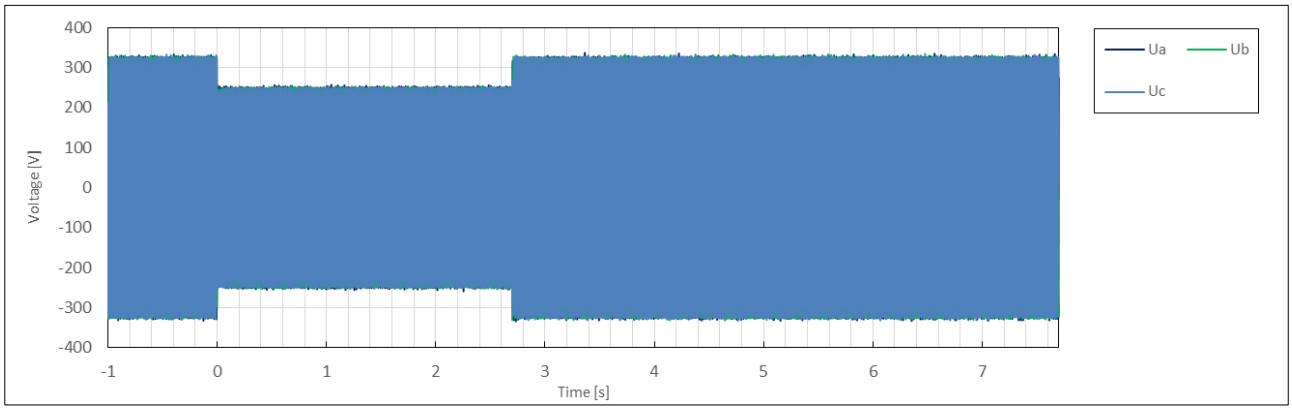
No. 4.2 Idle Test

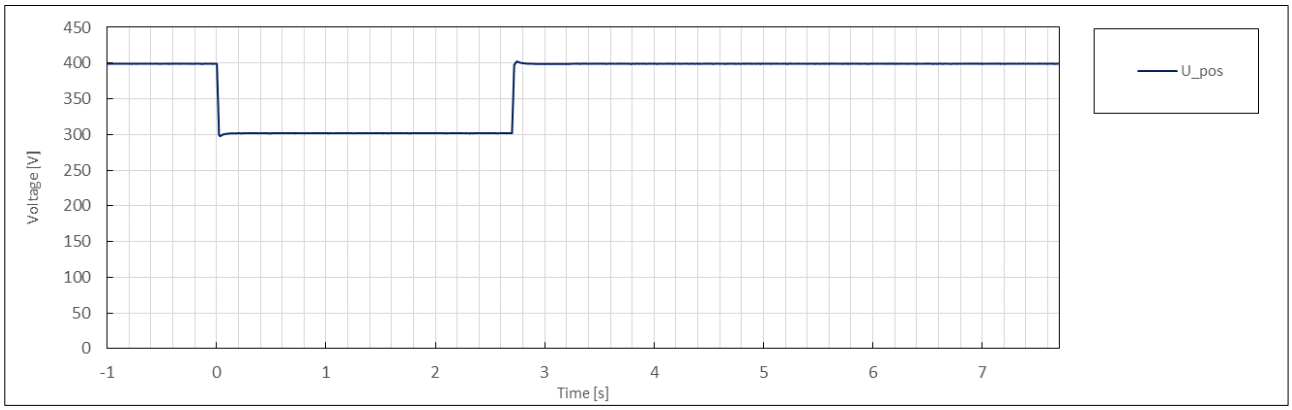


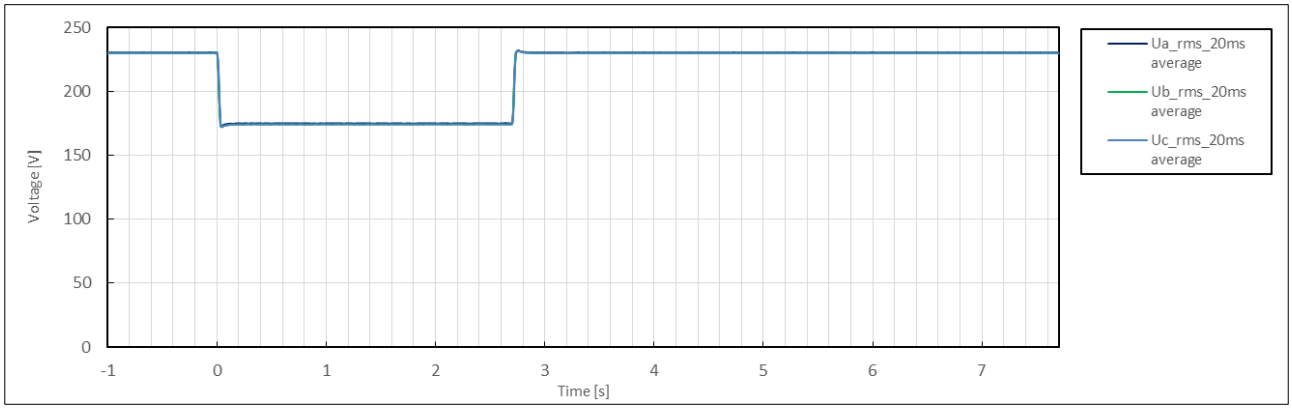


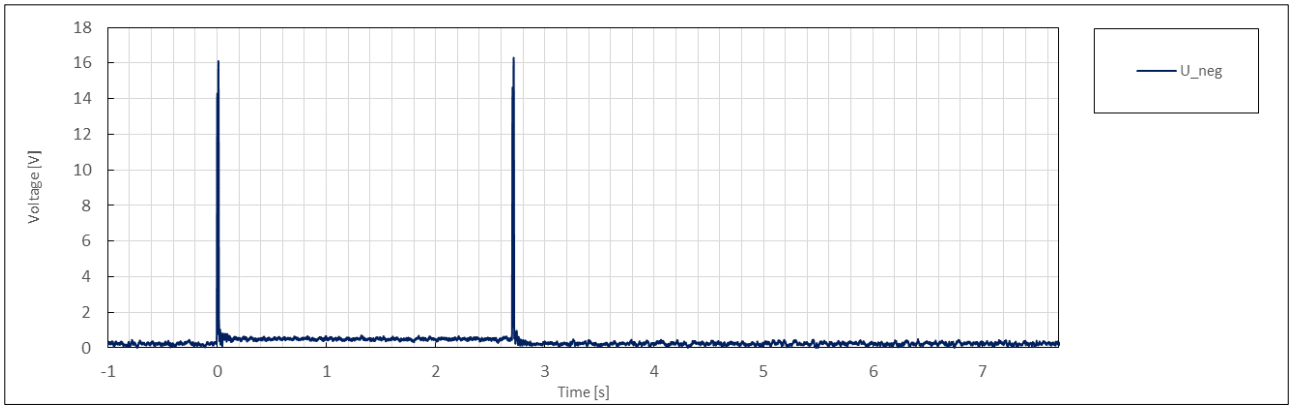


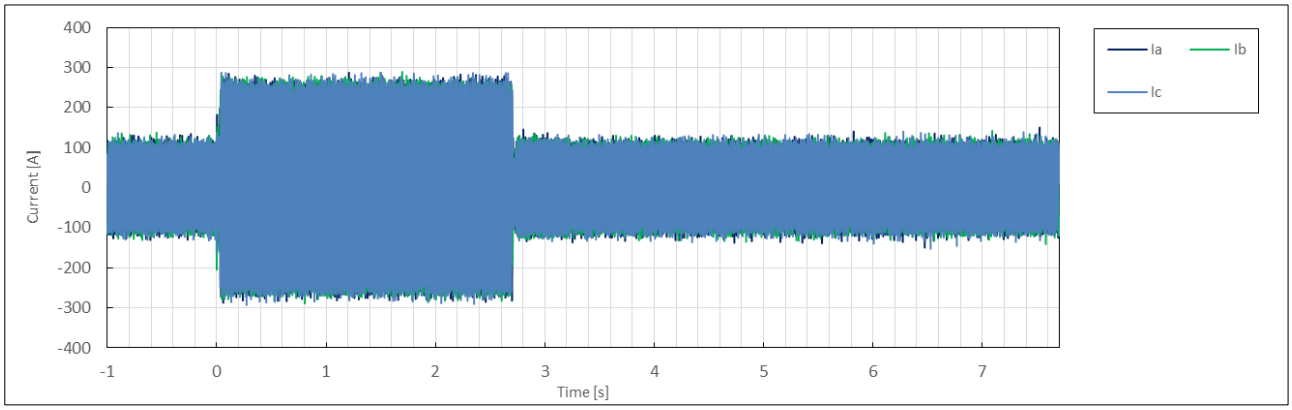
No. 4.2 Load Test

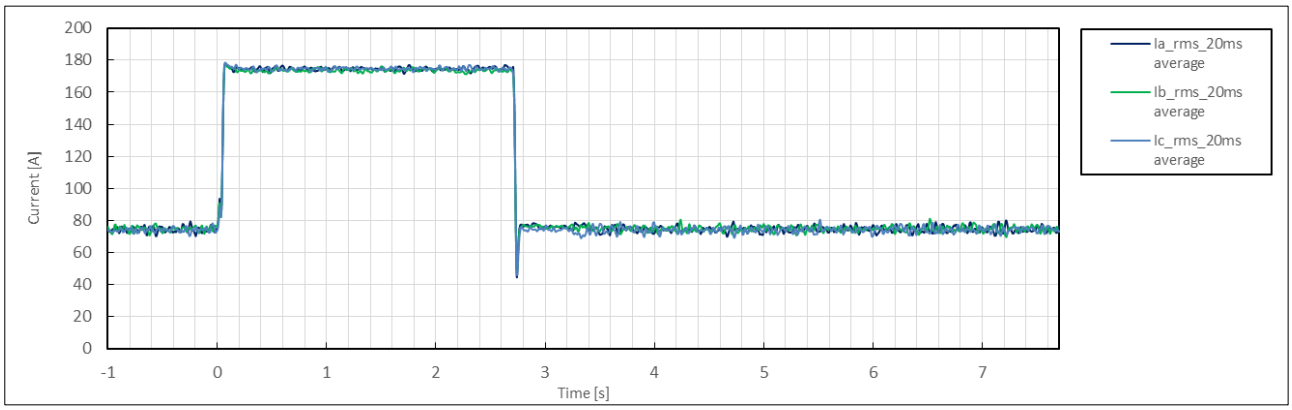


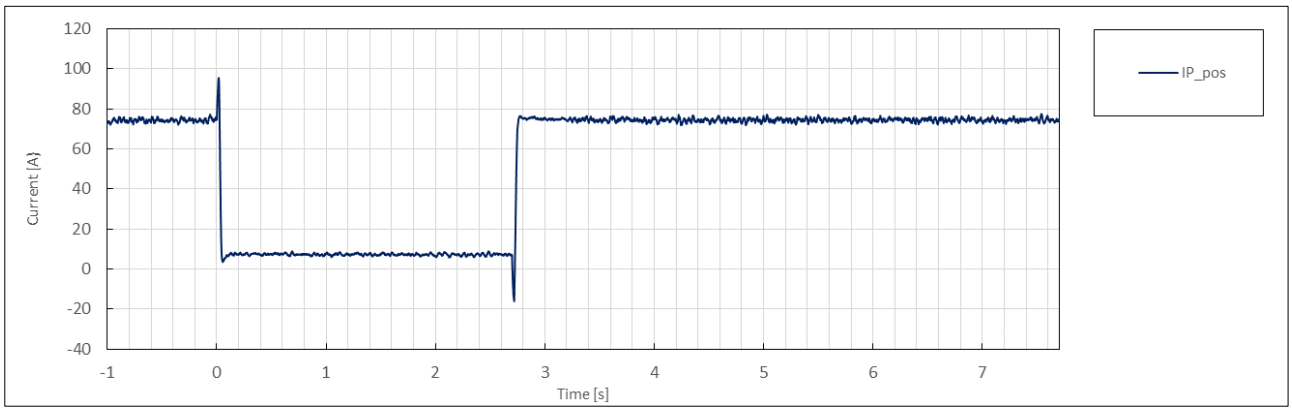


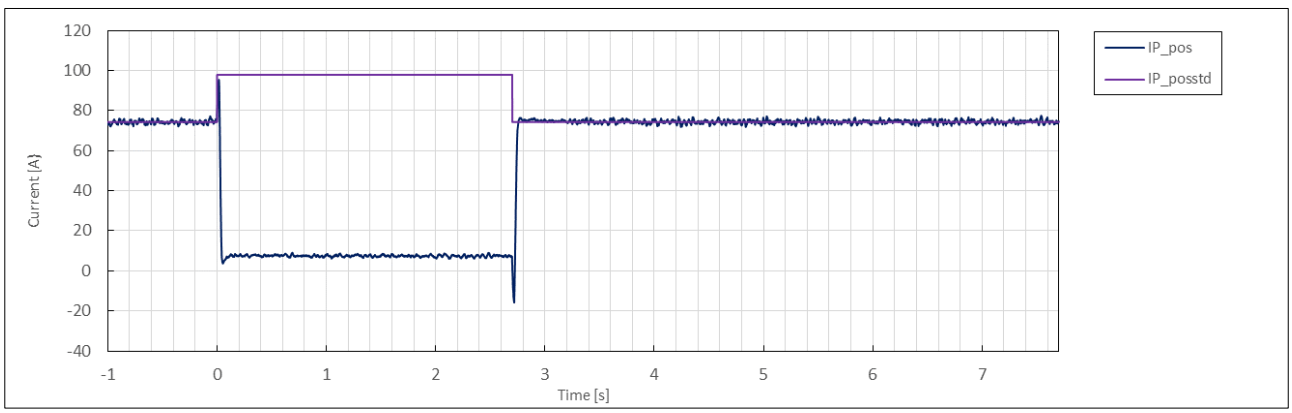


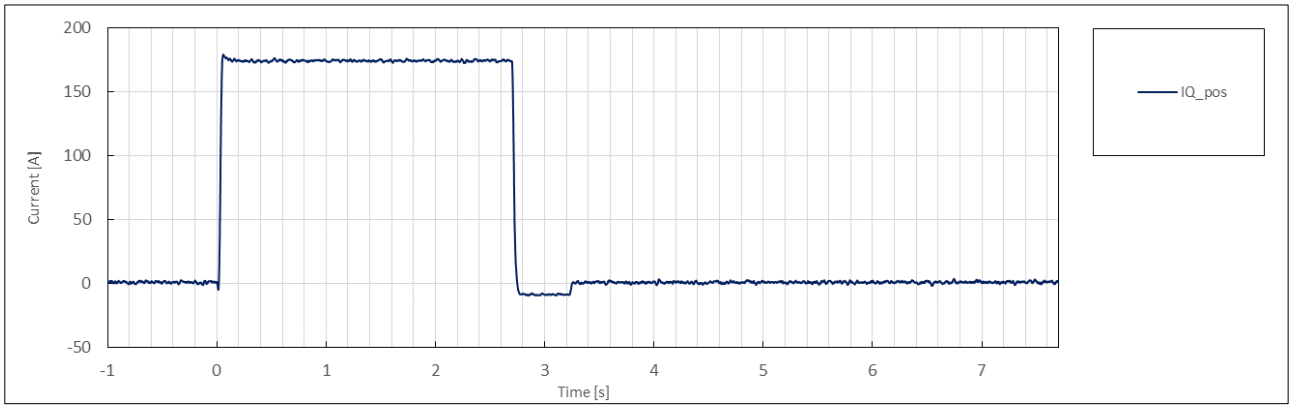


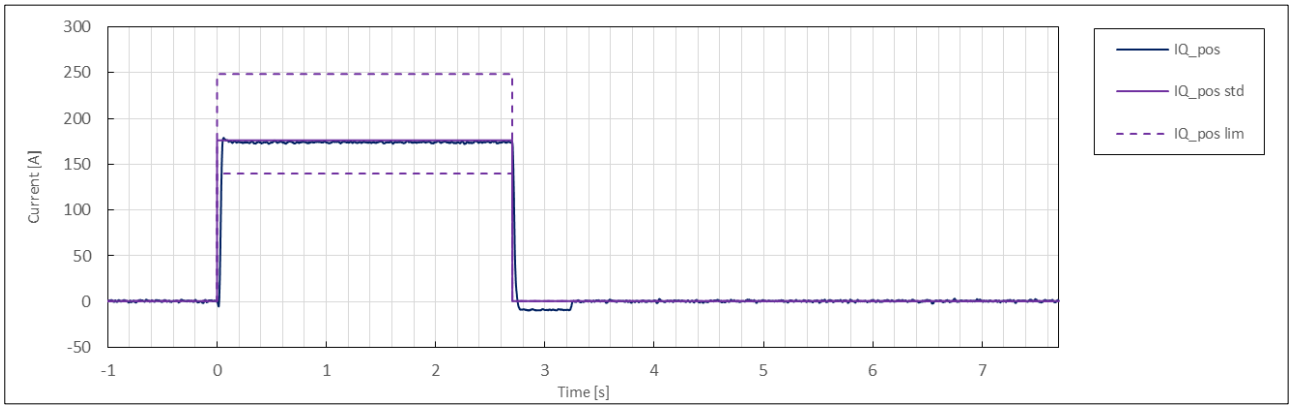

Current [A]
Time [s]
Ia
Ib
Ic

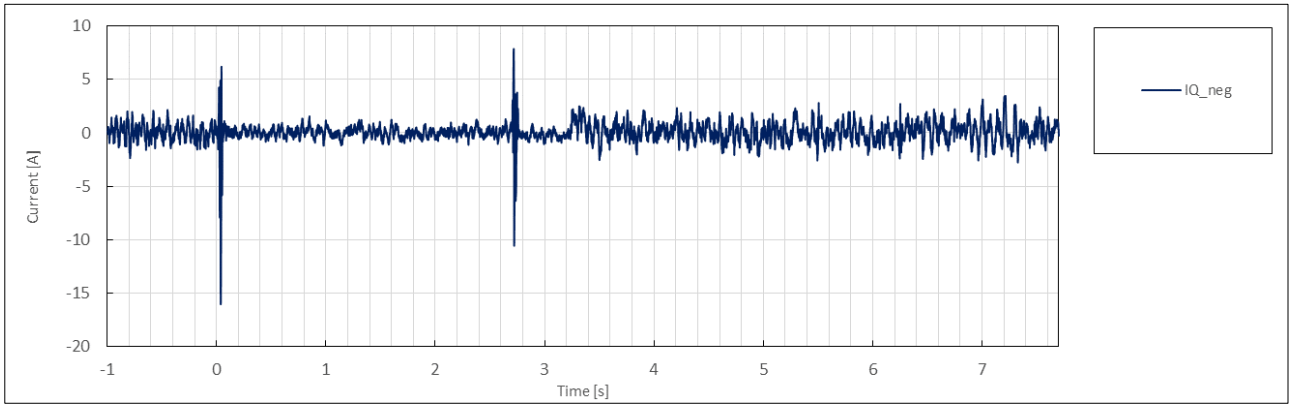

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

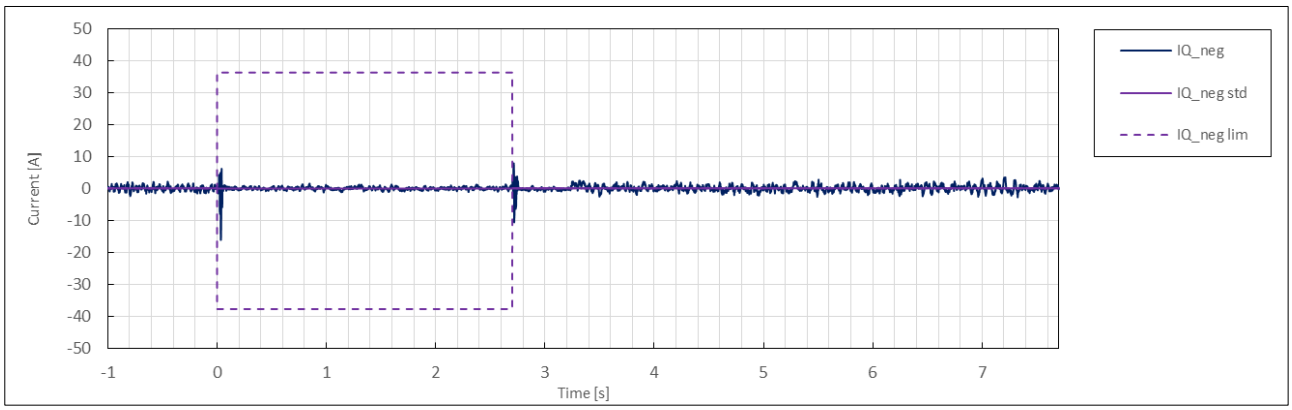

Current [A]
Time [s]
IP_pos

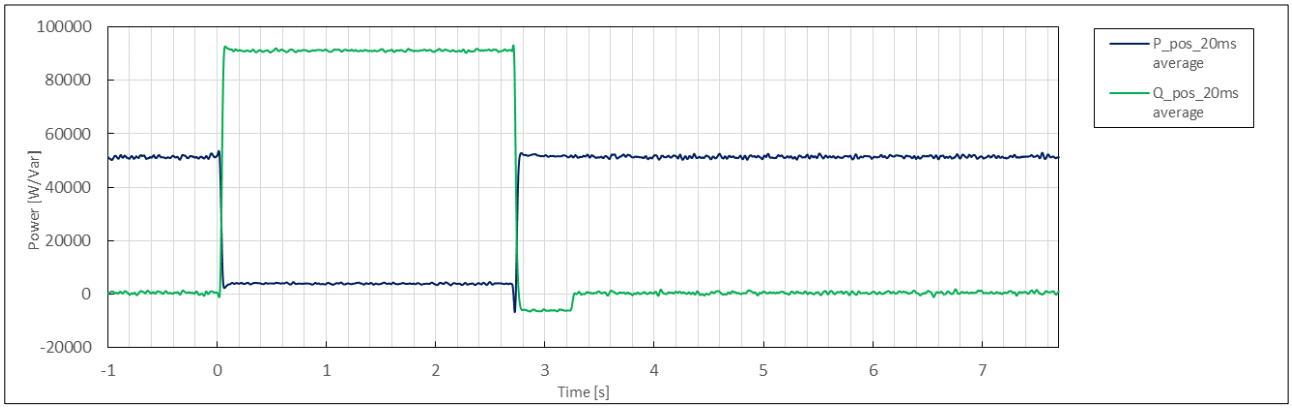

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

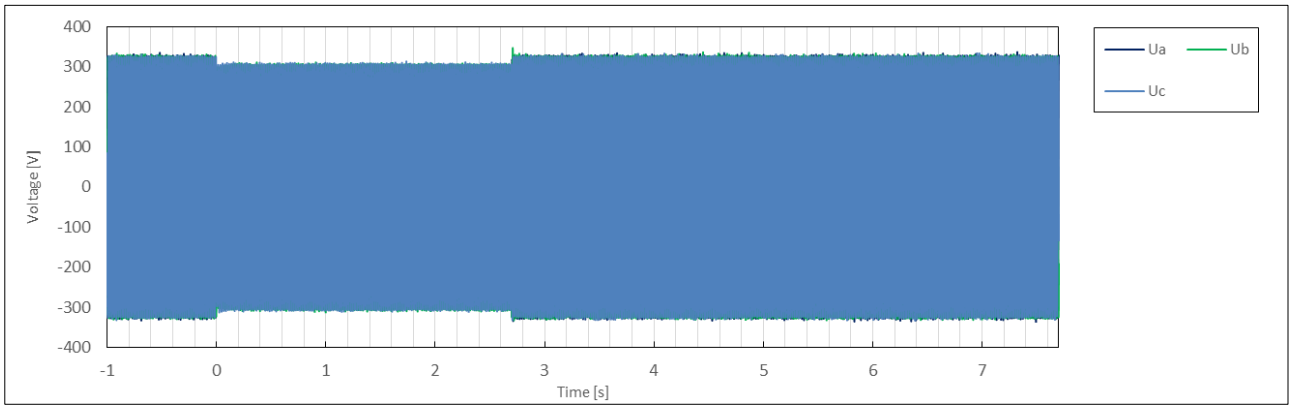

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

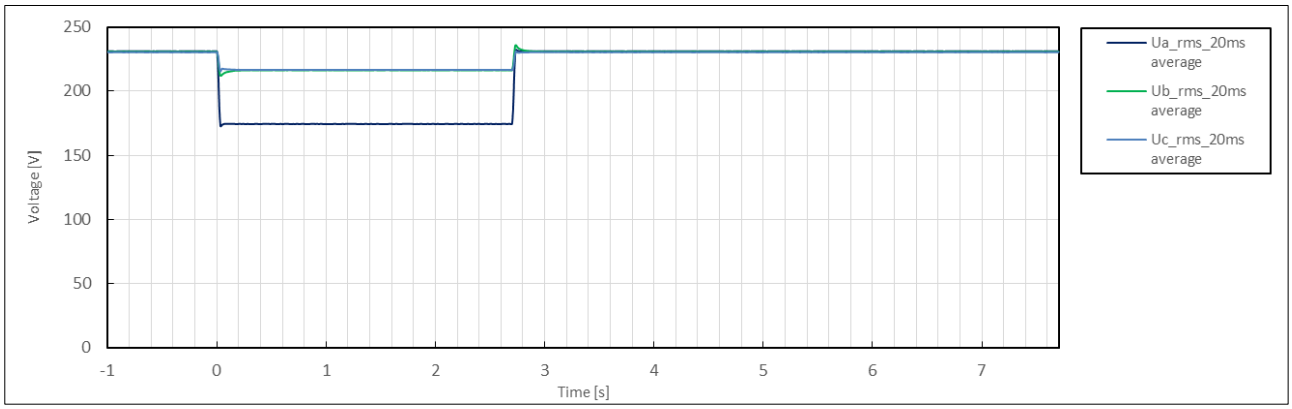

Current [A]
Time [s]
IQ_neg

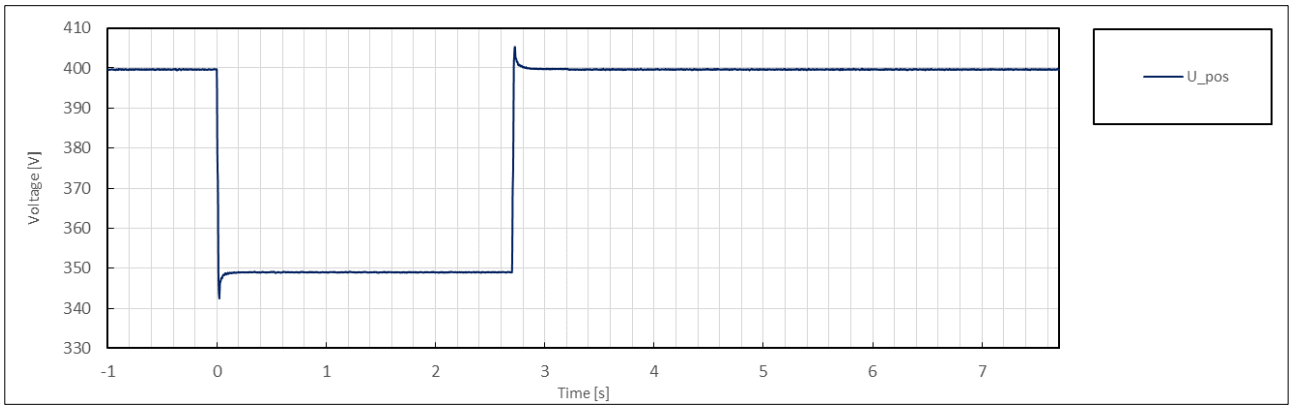

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


100000
80000
60000
40000
20000
0
-20000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
Time [s]
P_pos_20ms average
Q_pos_20ms average

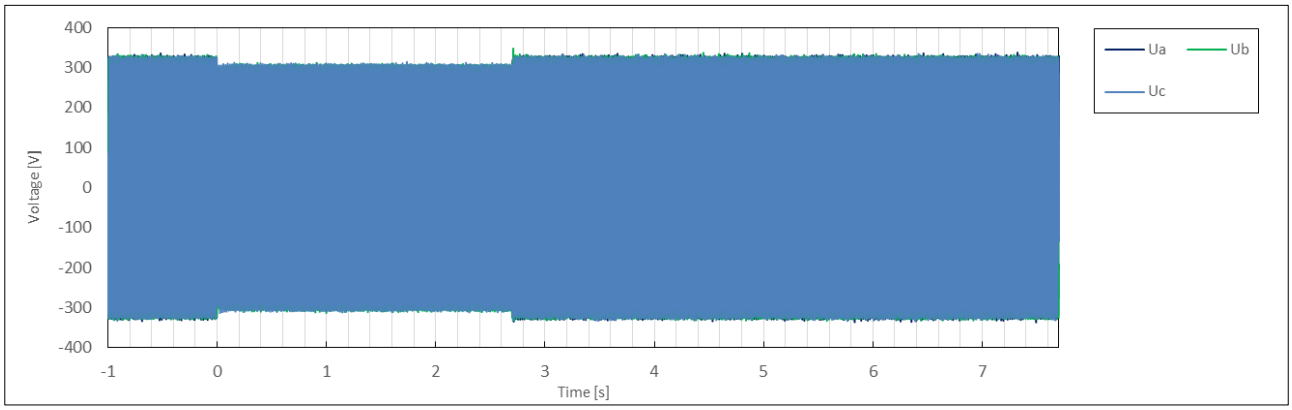
No. 4.3 Idle Test

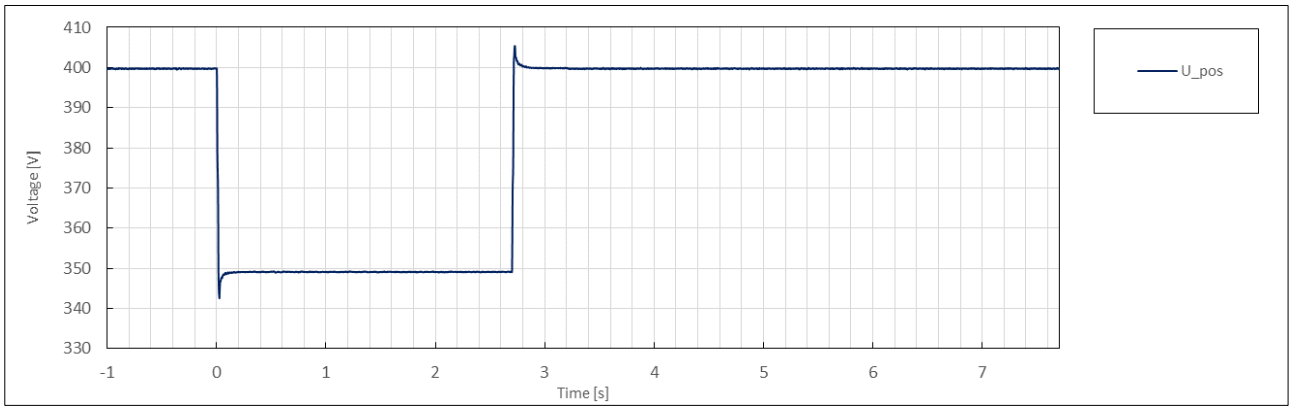


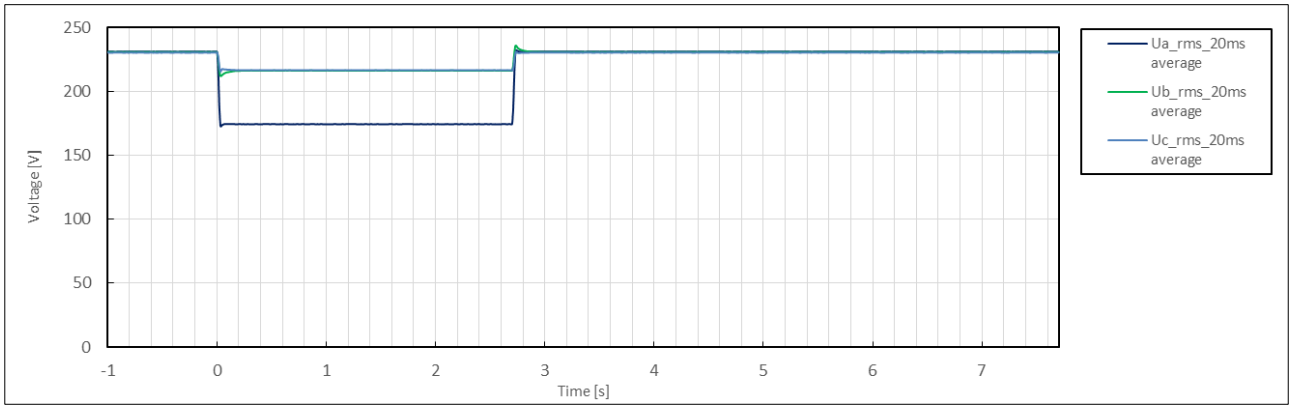


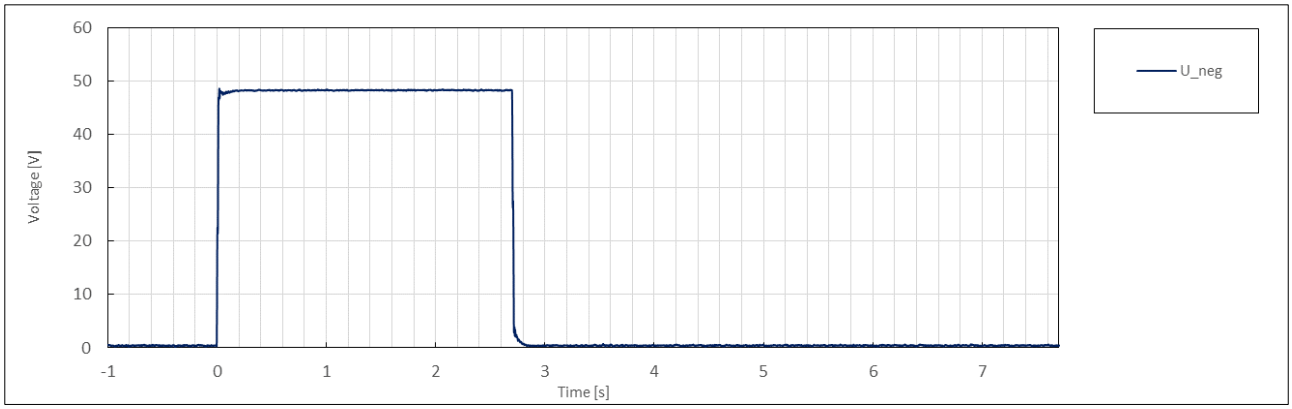


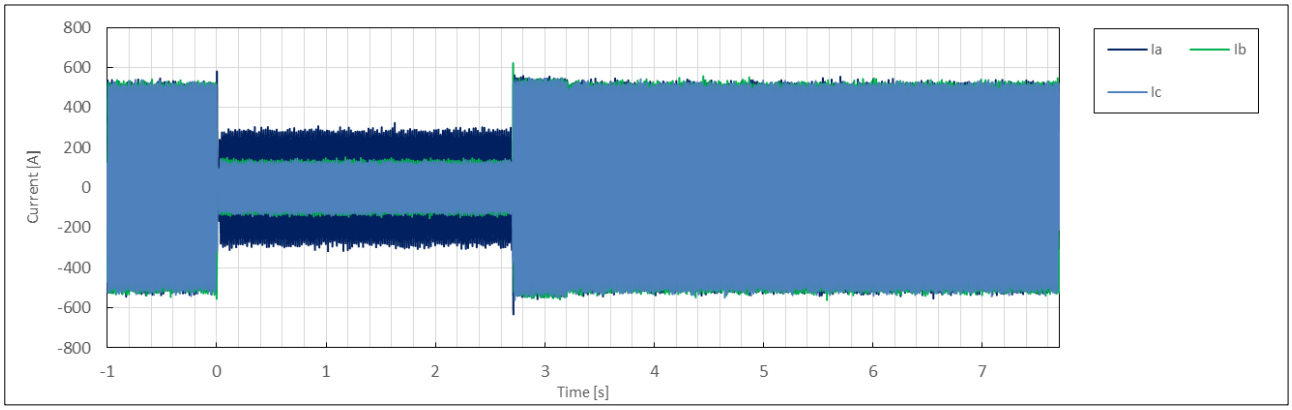
No. 4.3 Load Test

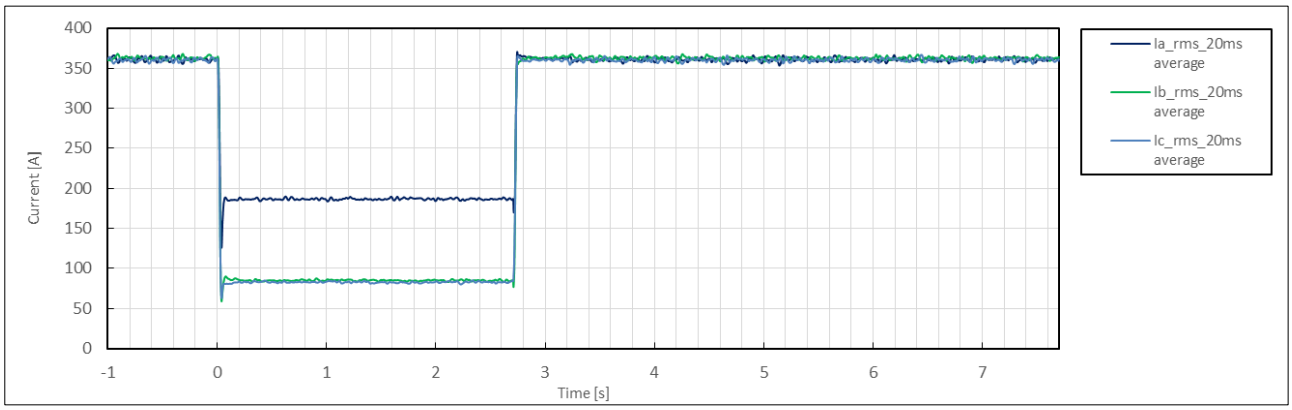


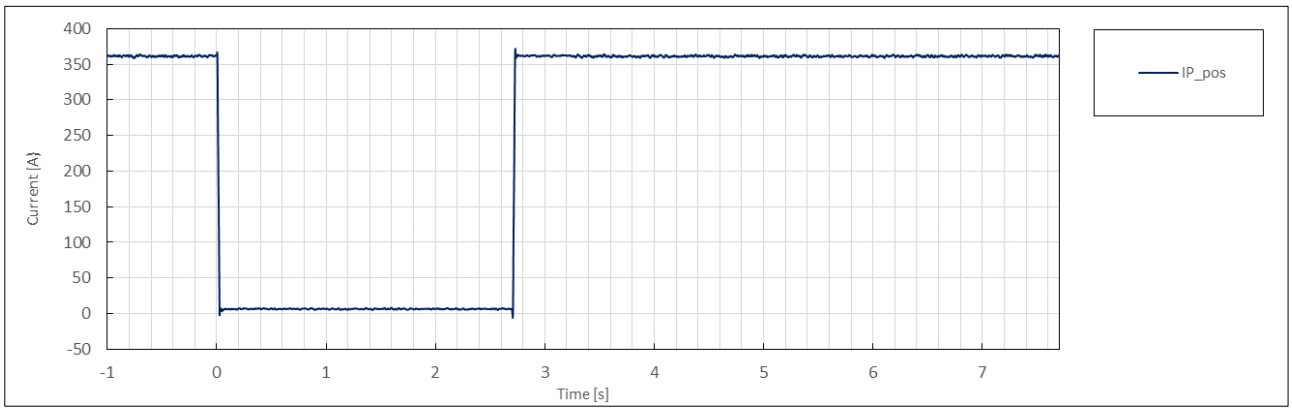


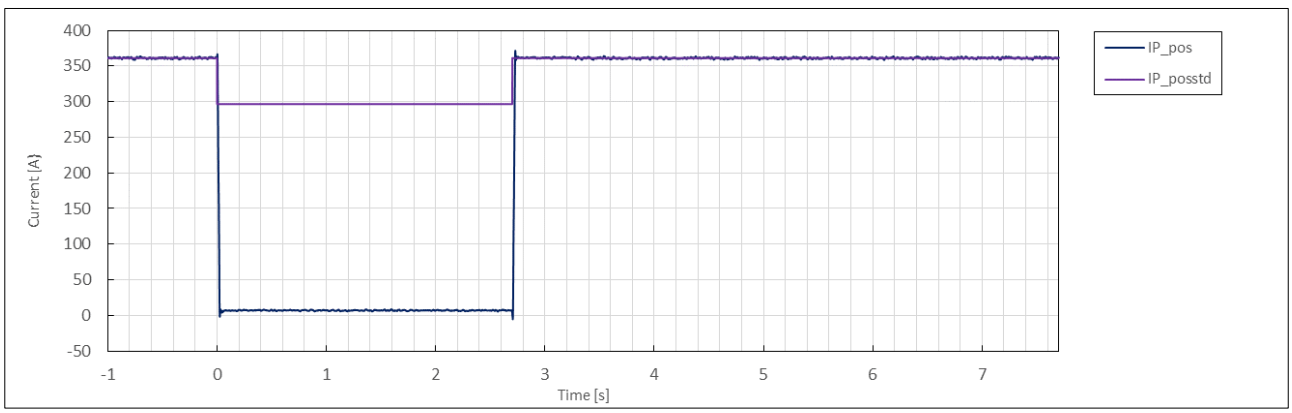


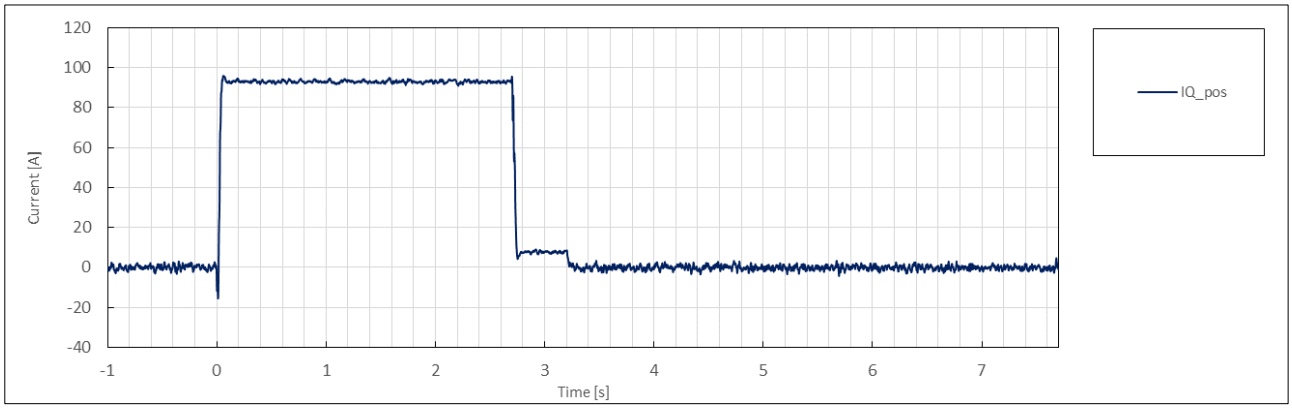


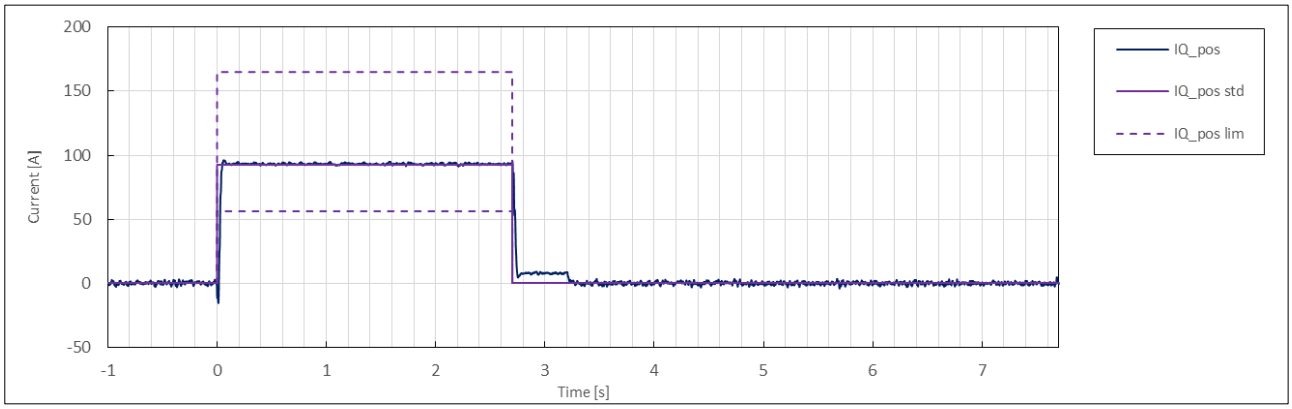

Current [A]
Time [s]
Ia
Ib
Ic

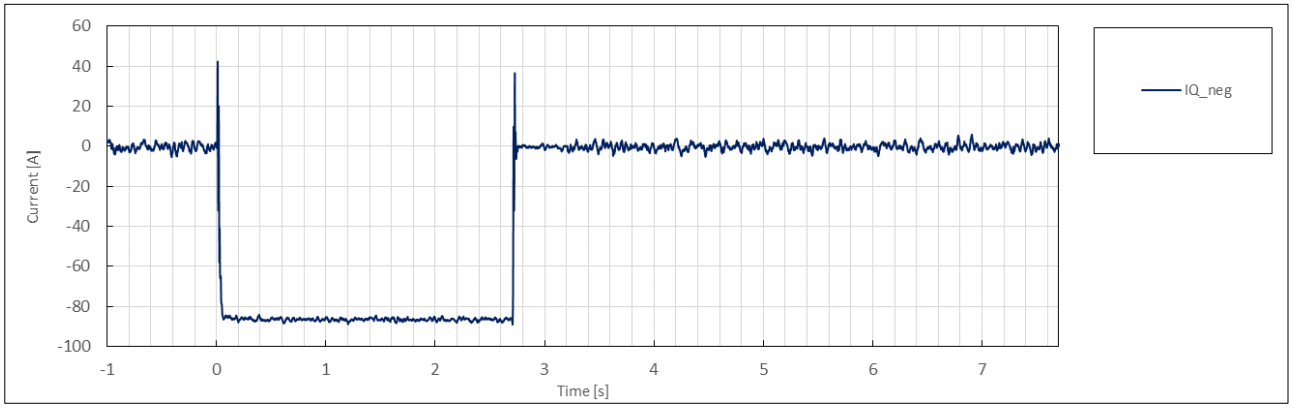

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

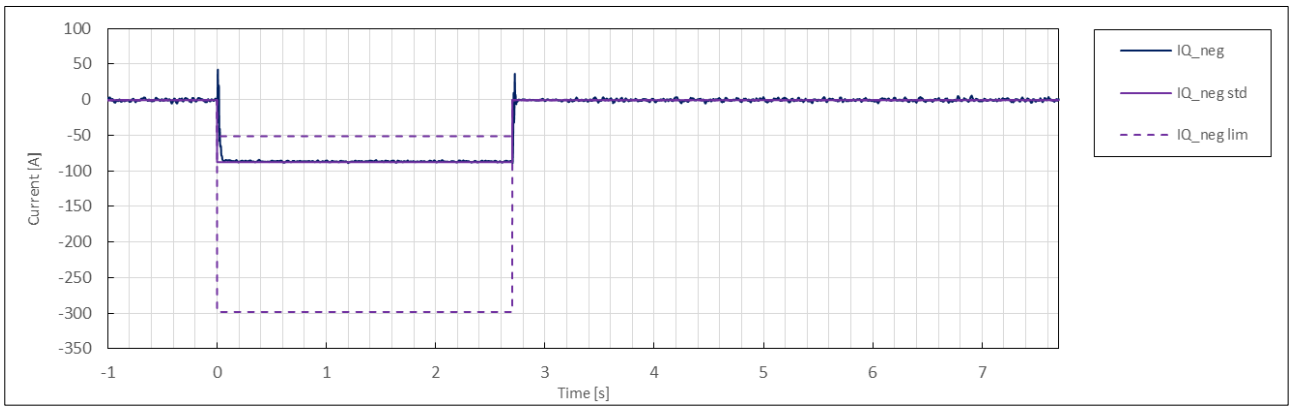

Current [A]
Time [s]
IP_pos

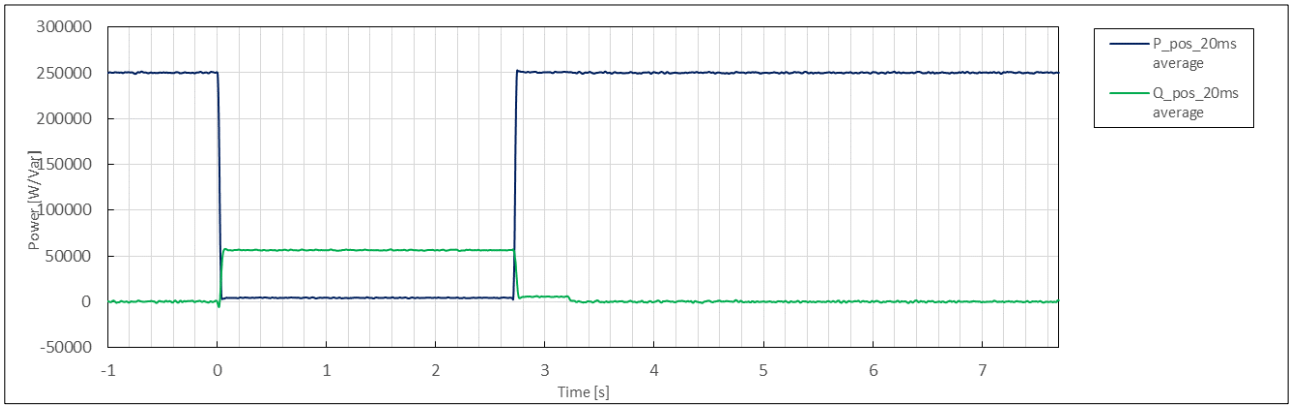

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

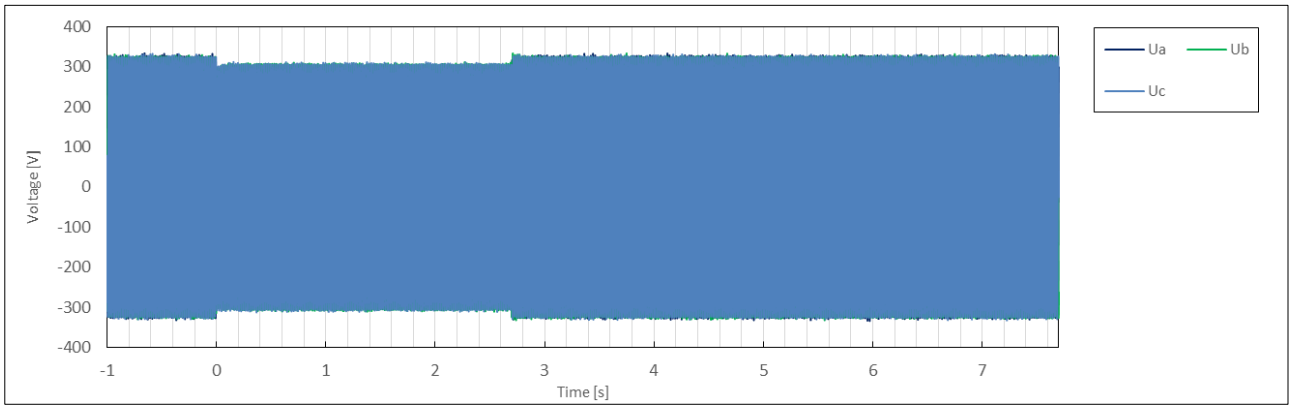

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

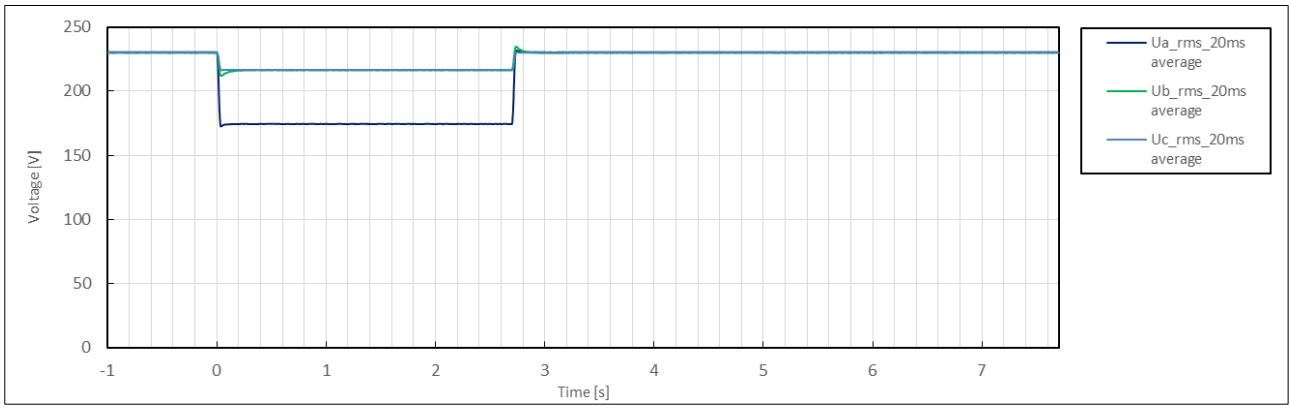

Current [A]
Time [s]
IQ_neg

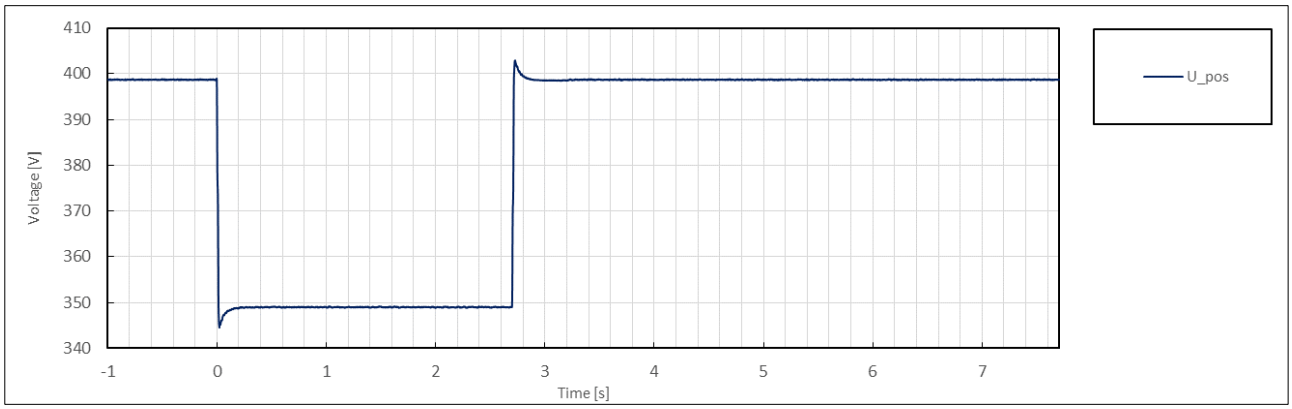

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
Time [s]
P_pos_20ms average
Q_pos_20ms average

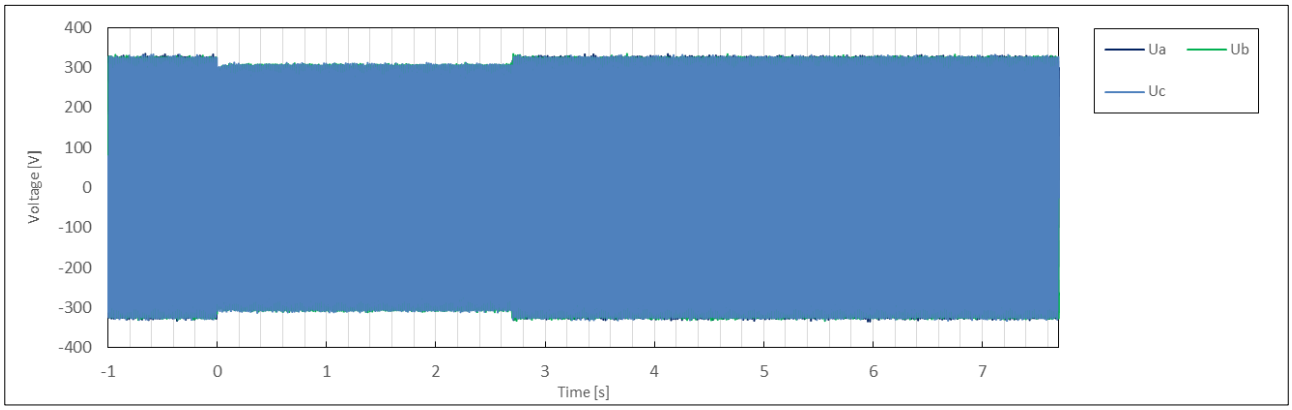
No. 4.4 Idle Test

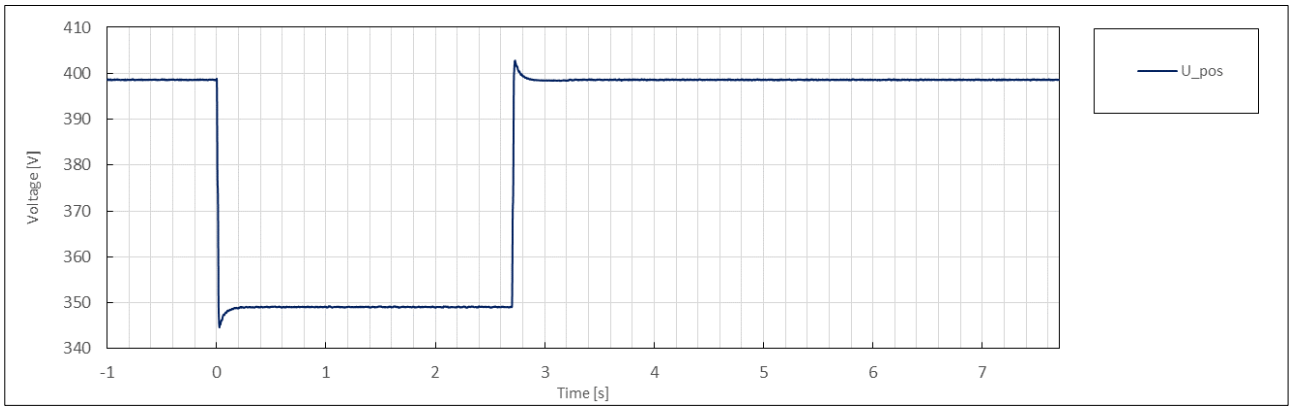


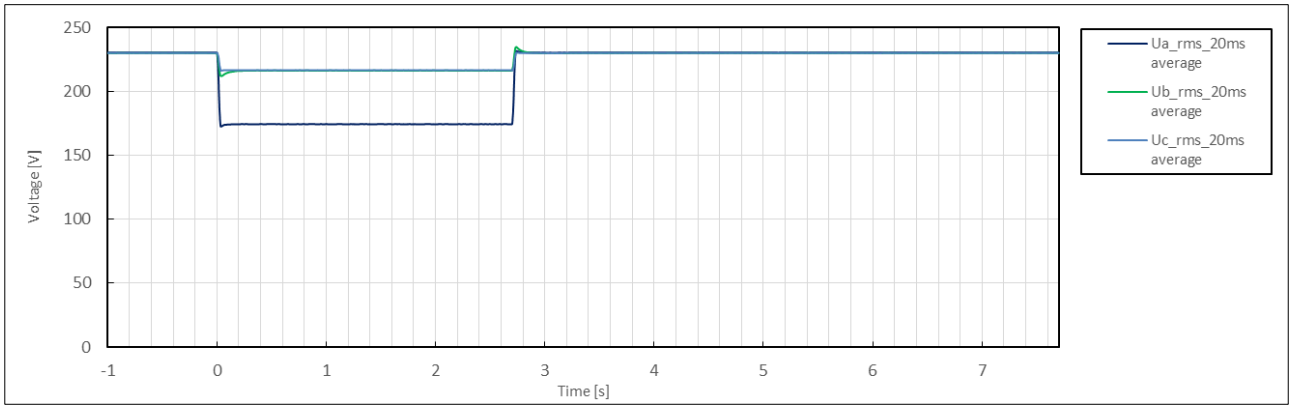


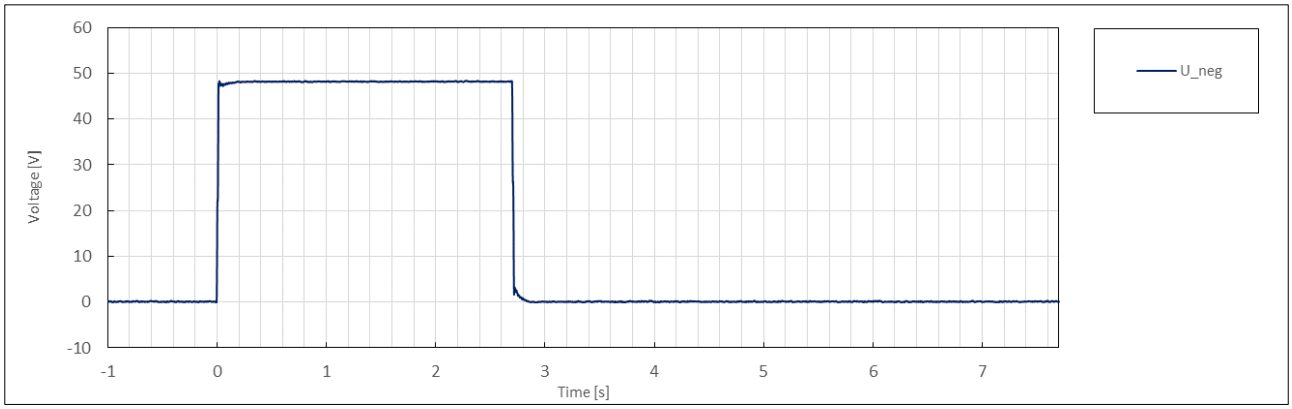


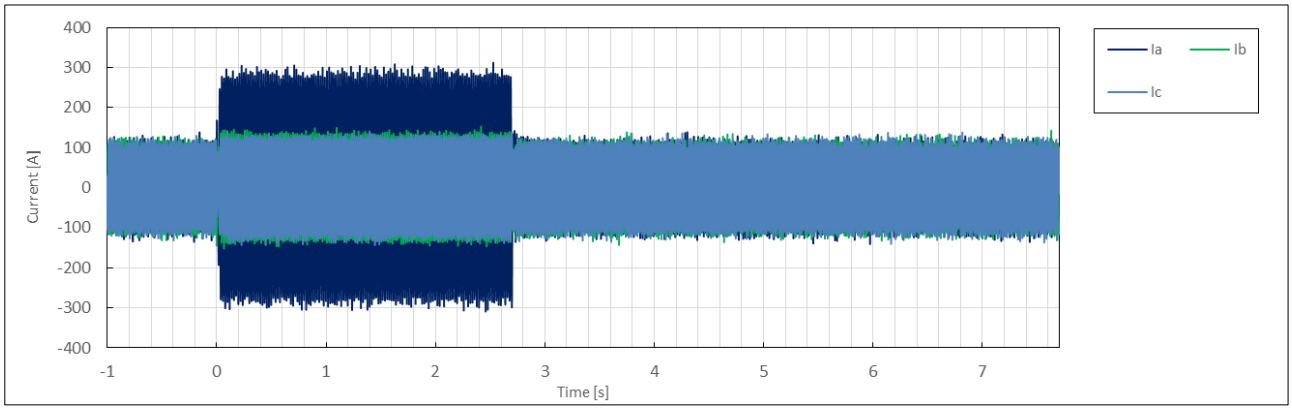
No. 4.4 Load Test

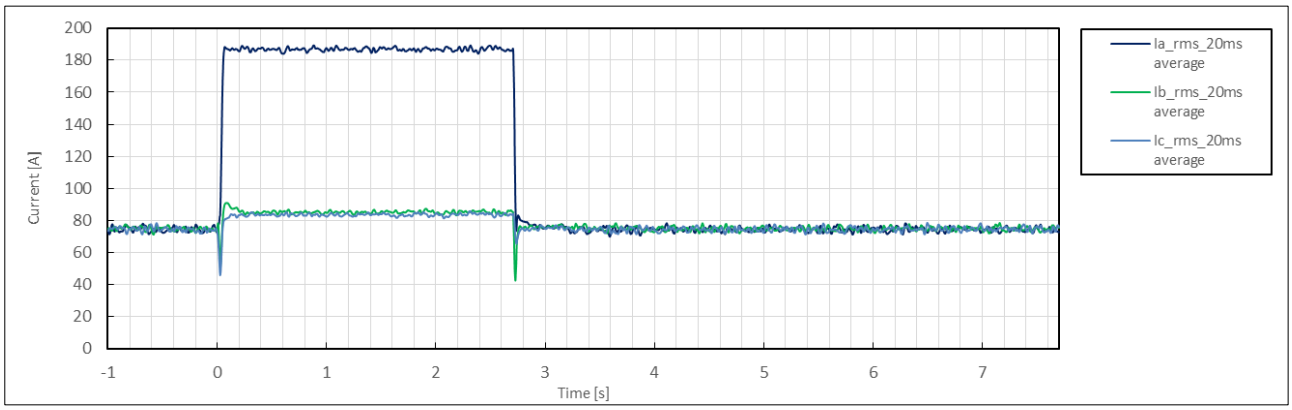


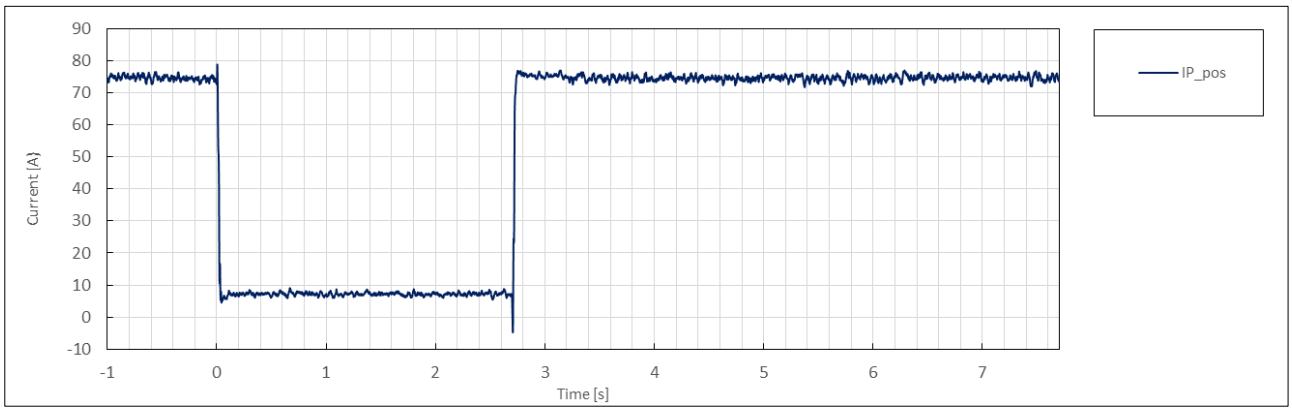


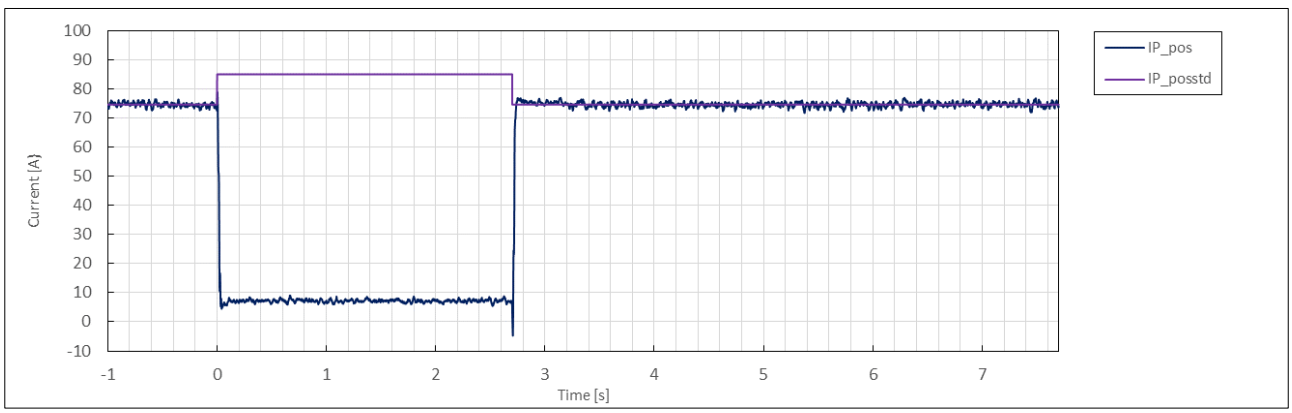


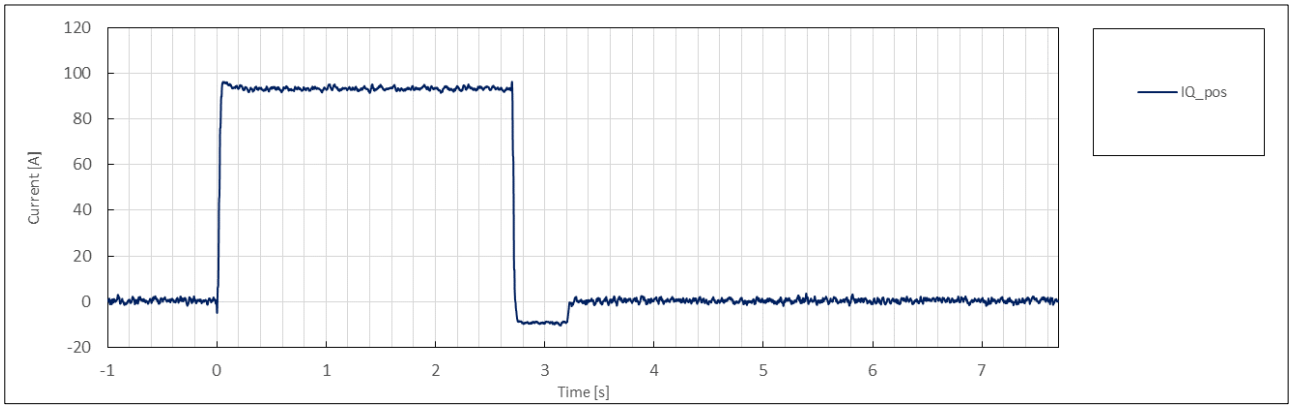


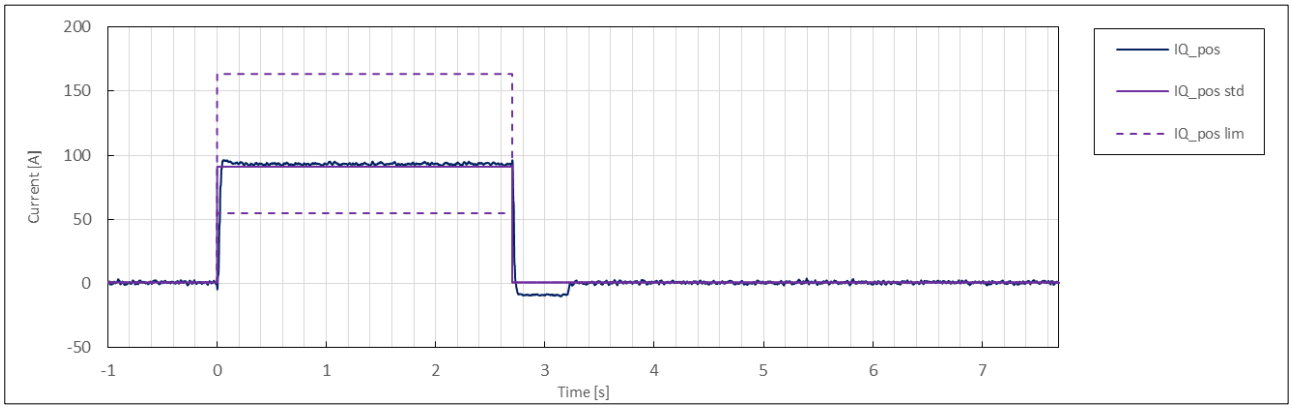

Current [A]
Time [s]
Ia
Ib
Ic

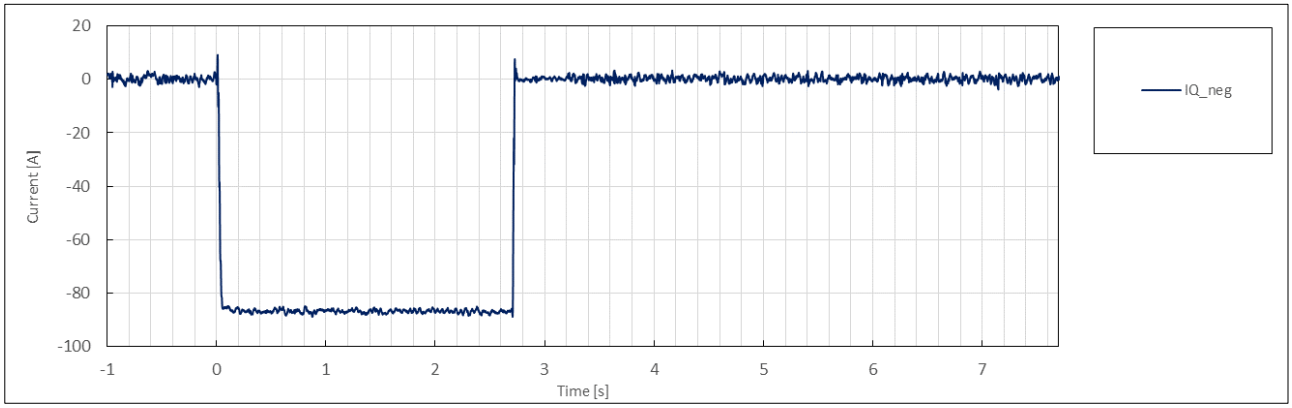

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

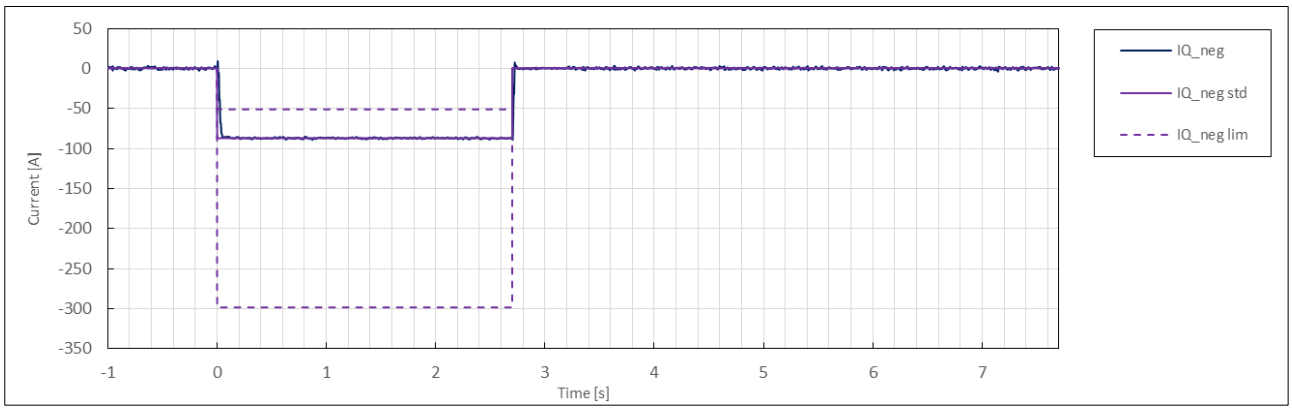

Current [A]
Time [s]
IP_pos

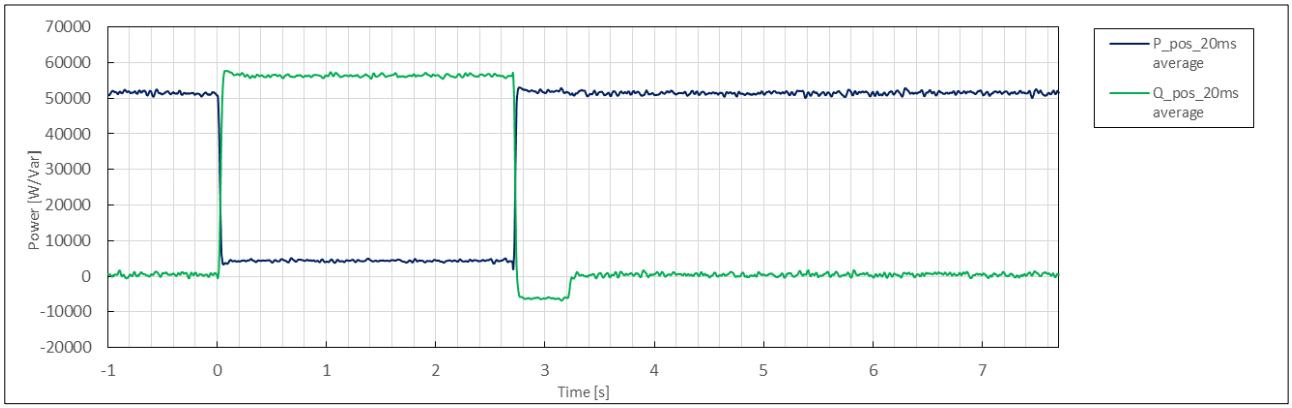

Current [A]
Time [s]
IP_pos
IP_posstd


120
100
80
60
40
20
0
-20
Current [A]
-1
0
1
2
3
4
5
6
7
Time [s]
IQ_pos

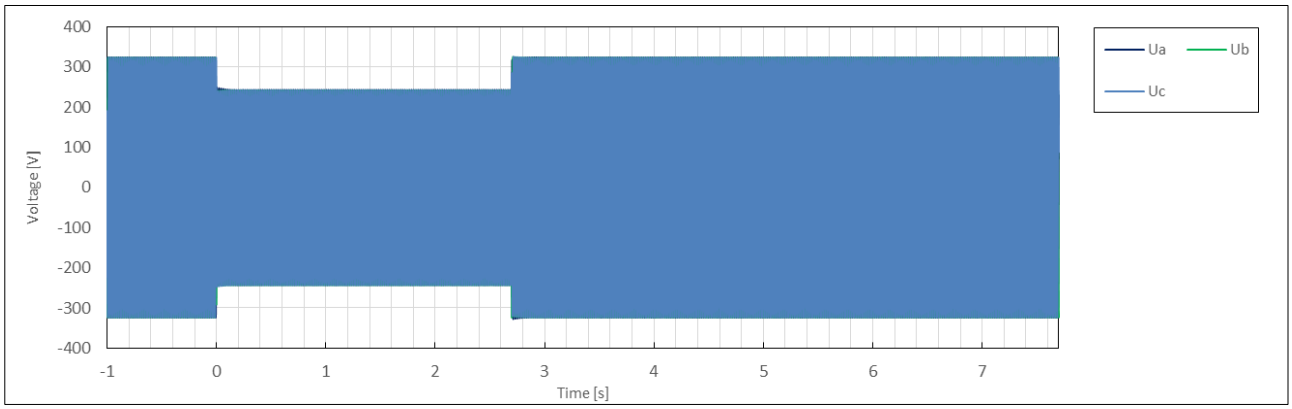

200
150
100
50
0
-50
Current [A]
-1
0
1
2
3
4
5
6
7
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

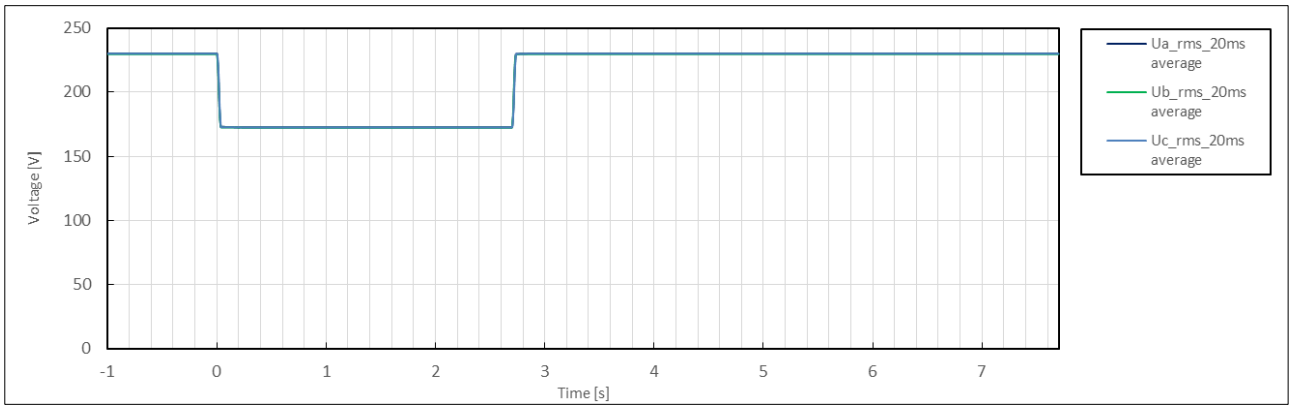

20
0
-20
-40
-60
-80
-100
Current [A]
-1
0
1
2
3
4
5
6
7
Time [s]
IQ_neg

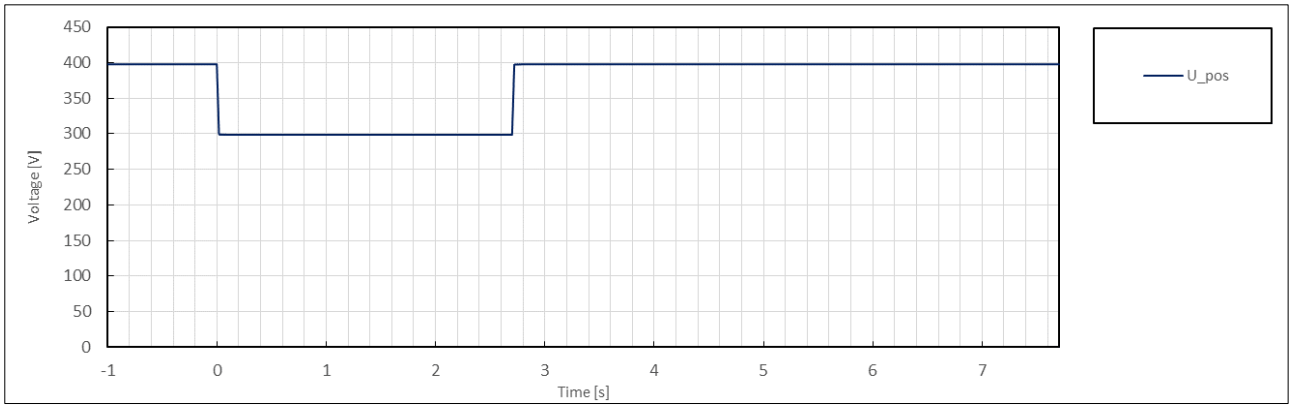

50
0
-50
-100
-150
-200
-250
-300
-350
Current [A]
-1
0
1
2
3
4
5
6
7
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim



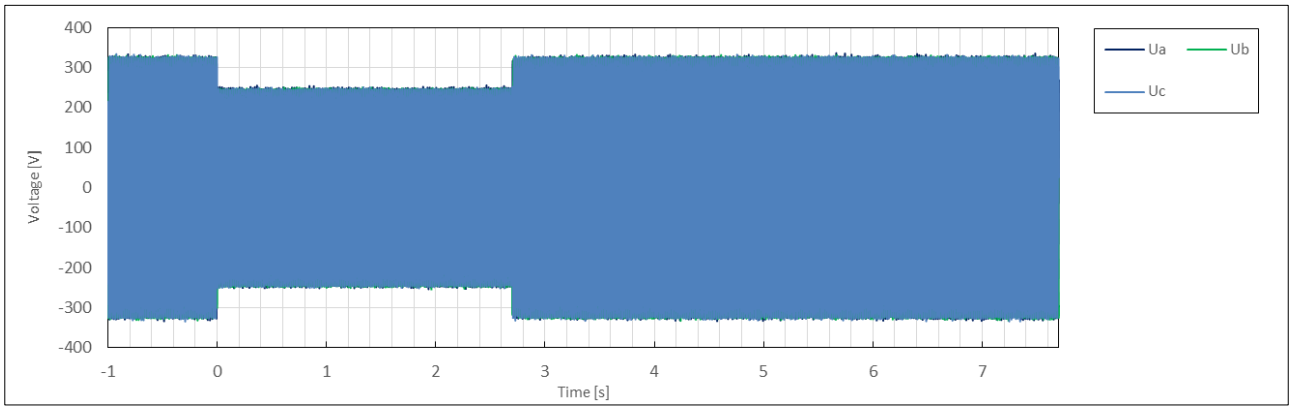
No. 4.5 Idle Test

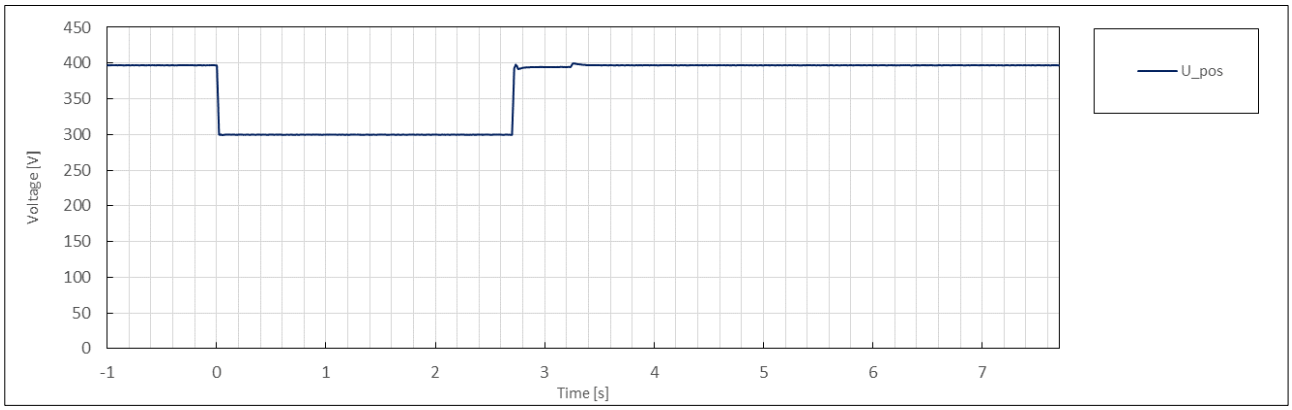


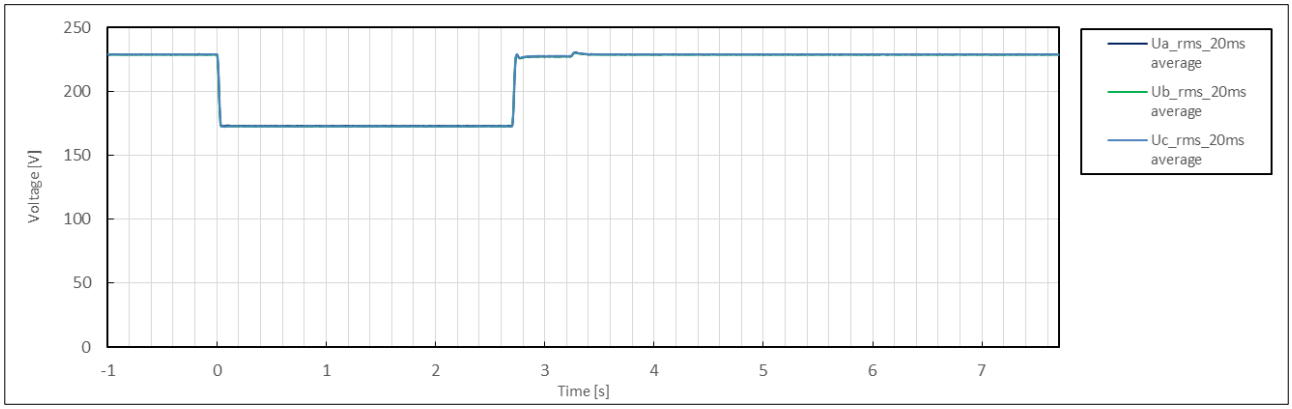


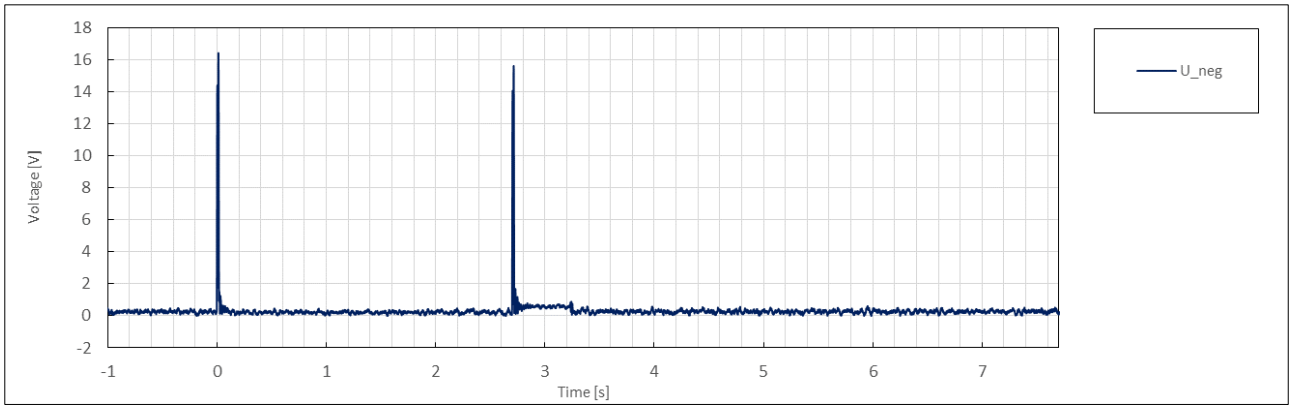


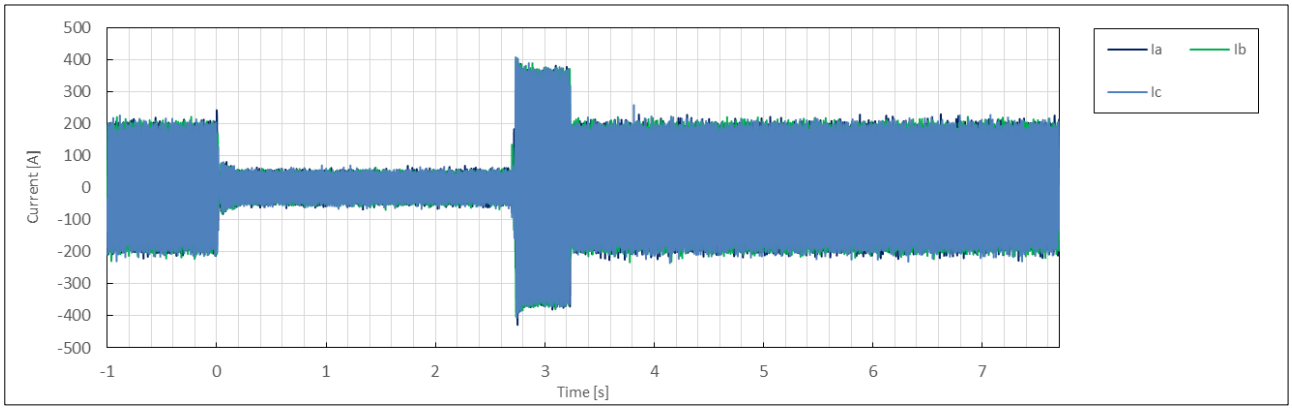
No. 4.5 Load Test

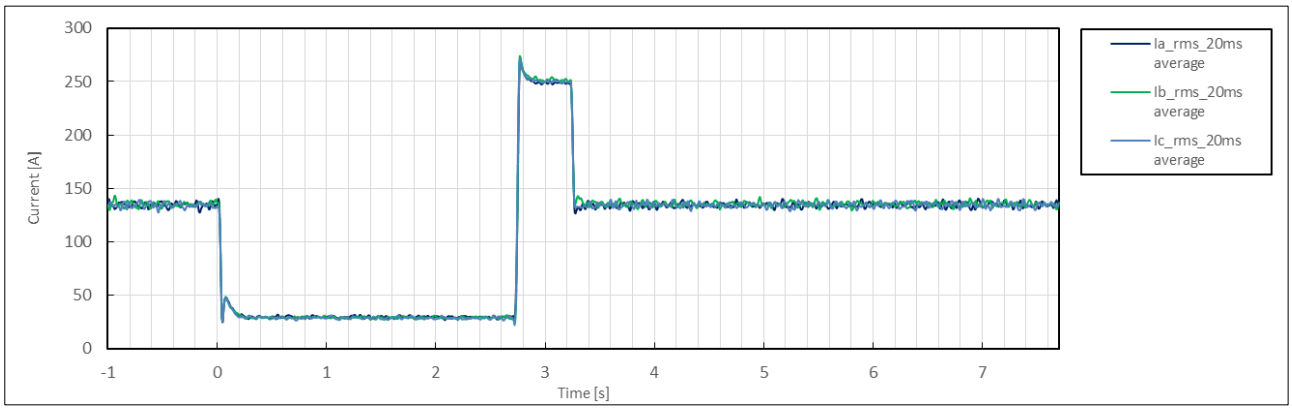


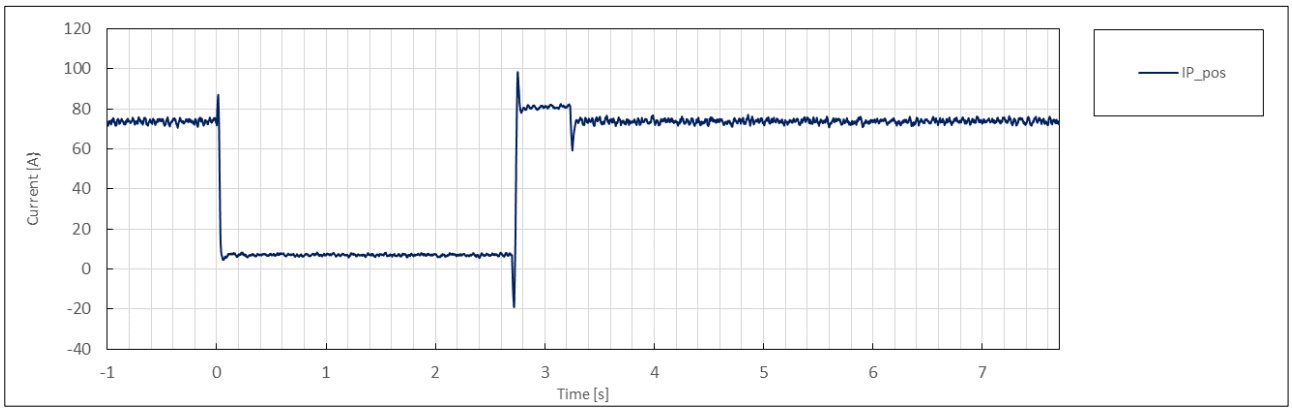


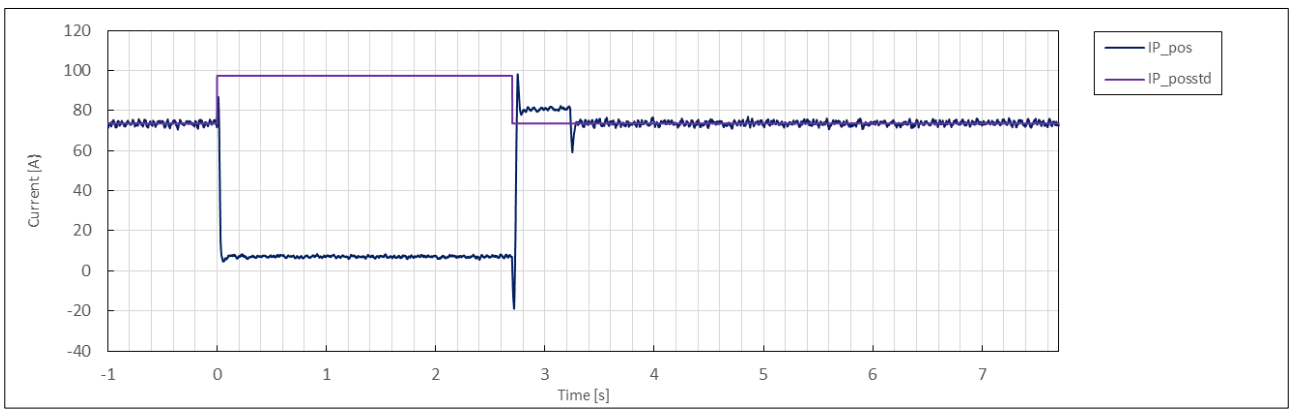


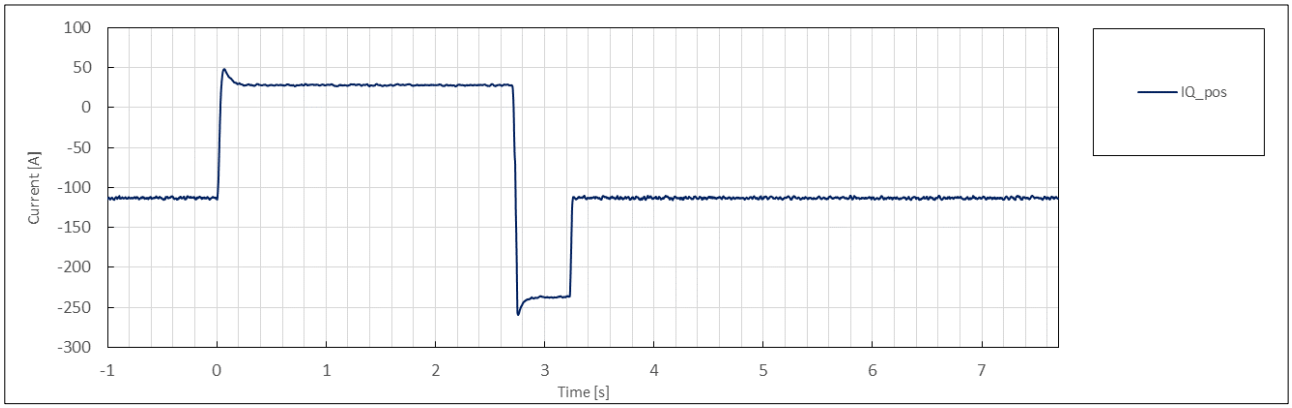


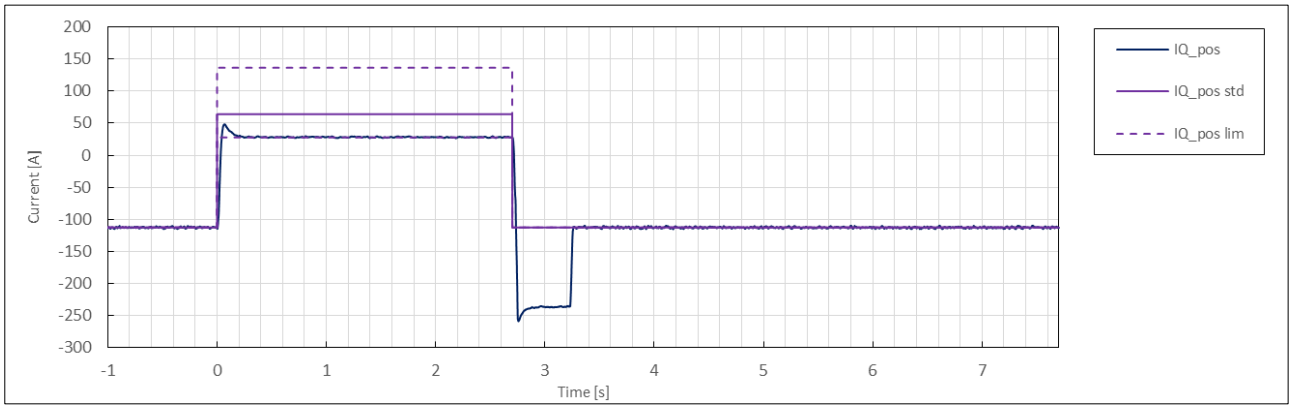

Current [A]
Time [s]
Ia
Ib
Ic

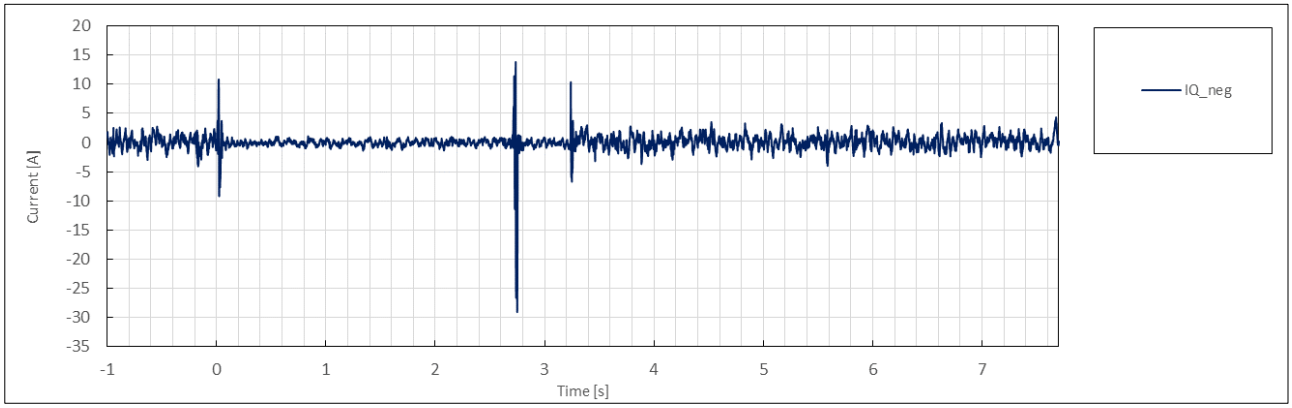

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

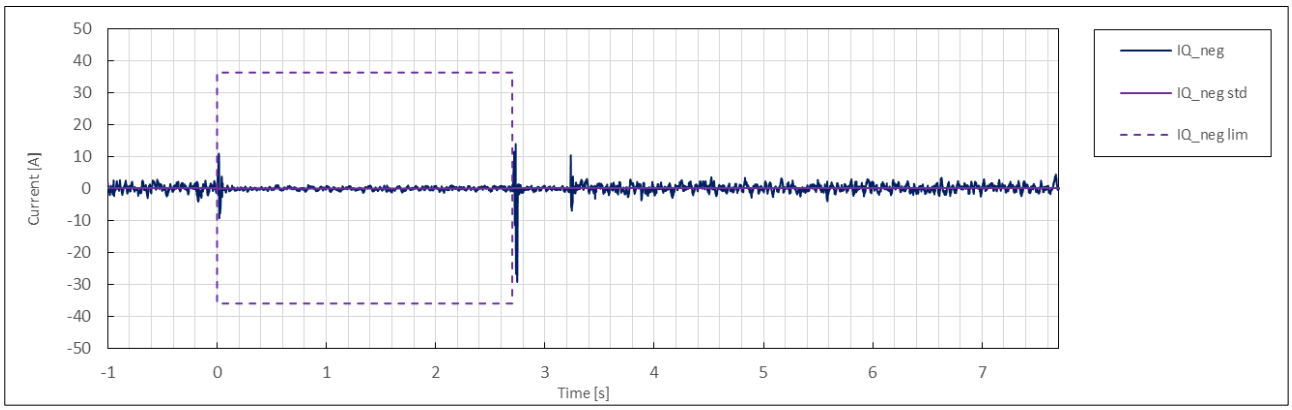

Current [A]
Time [s]
IP_pos

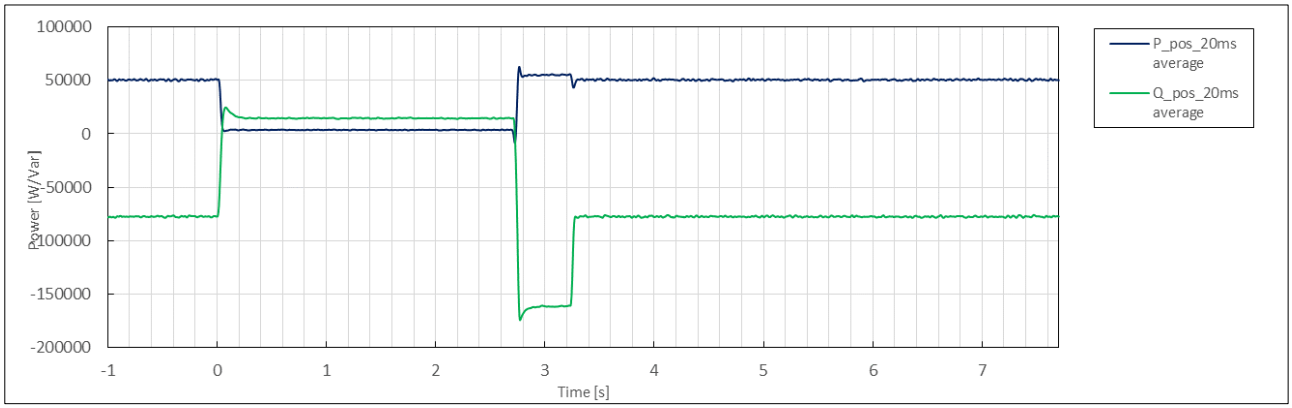

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

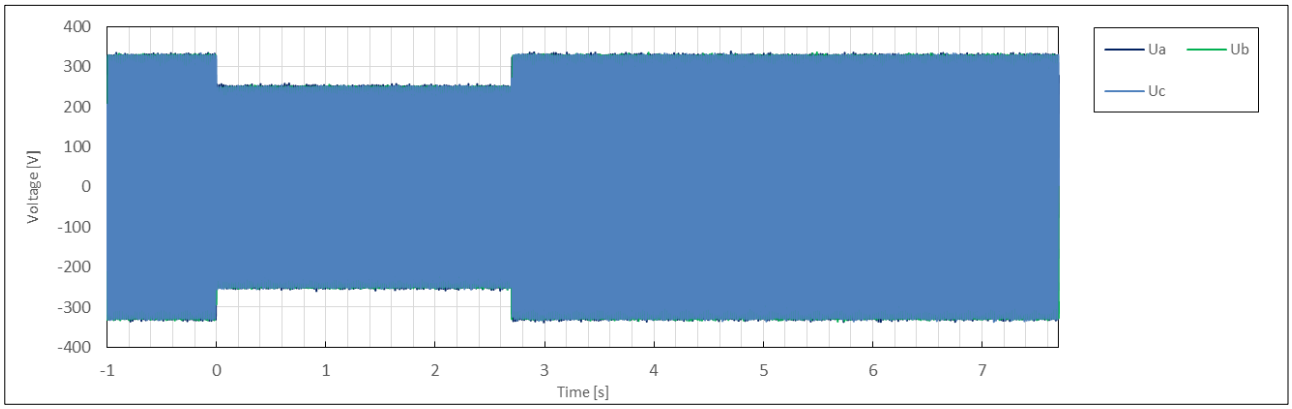

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

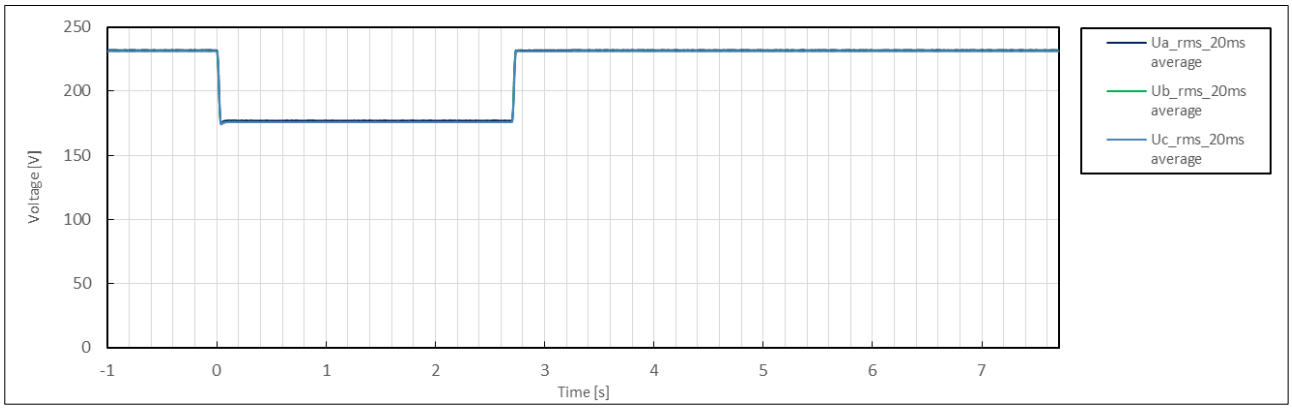

Current [A]
Time [s]
IQ_neg

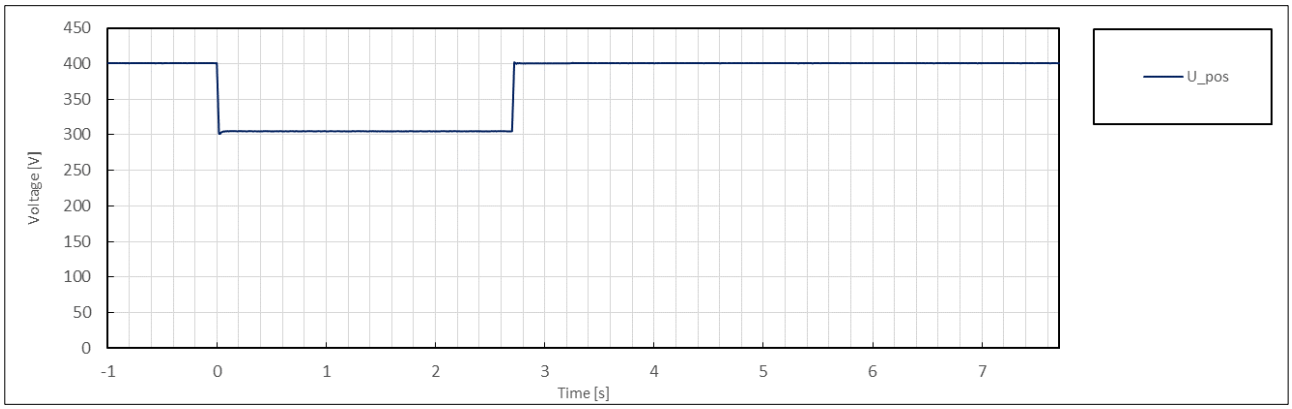

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


100000
50000
0
-50000
-100000
-150000
-200000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
Time [s]
P_pos_20ms average
Q_pos_20ms average

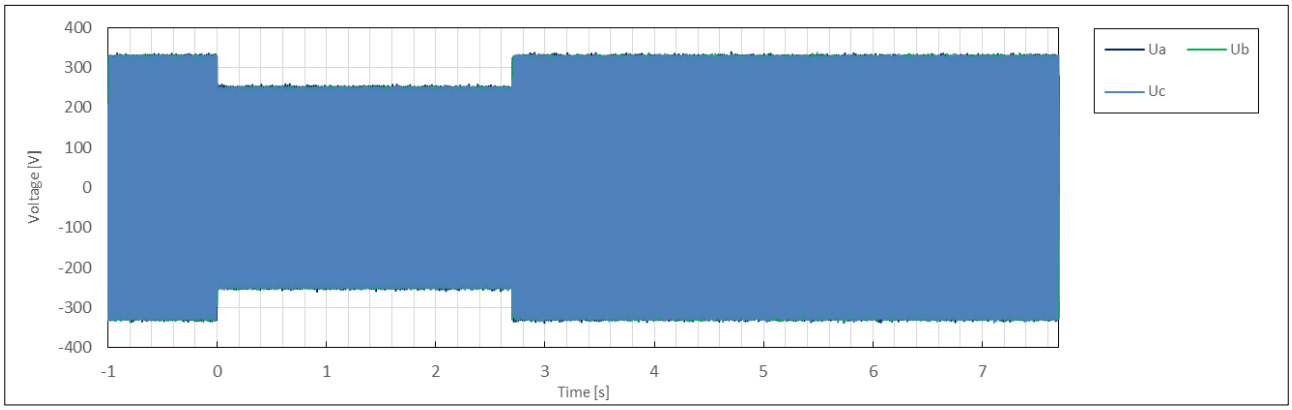
No. 4.6 Idle Test

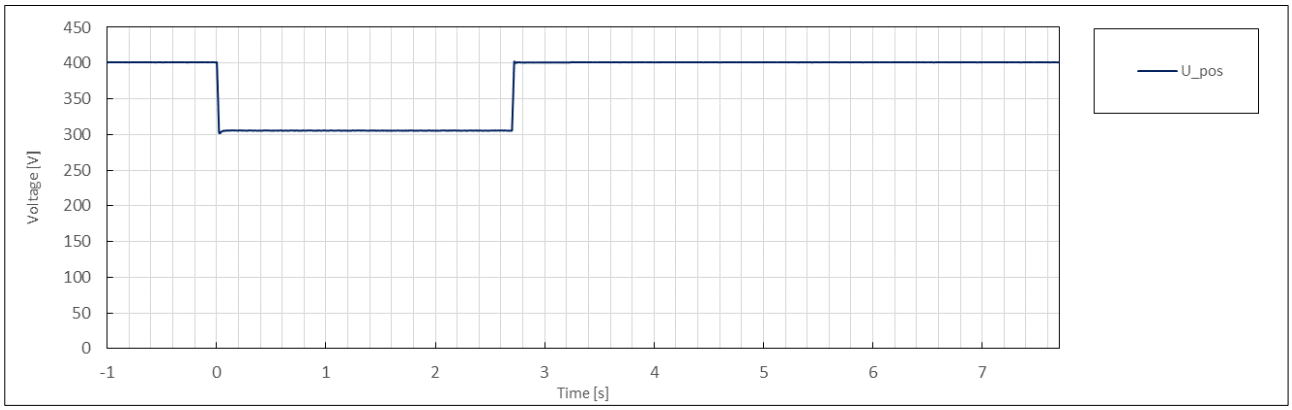


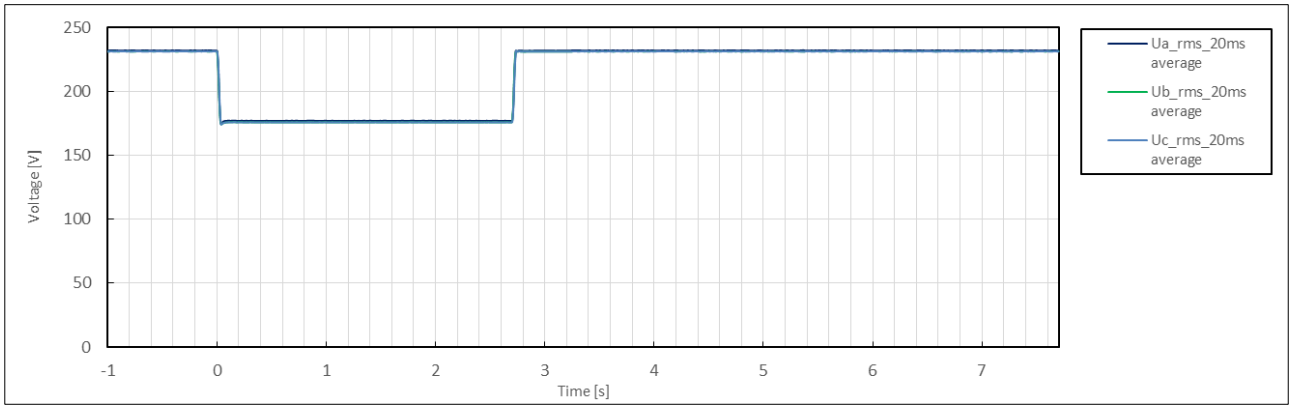


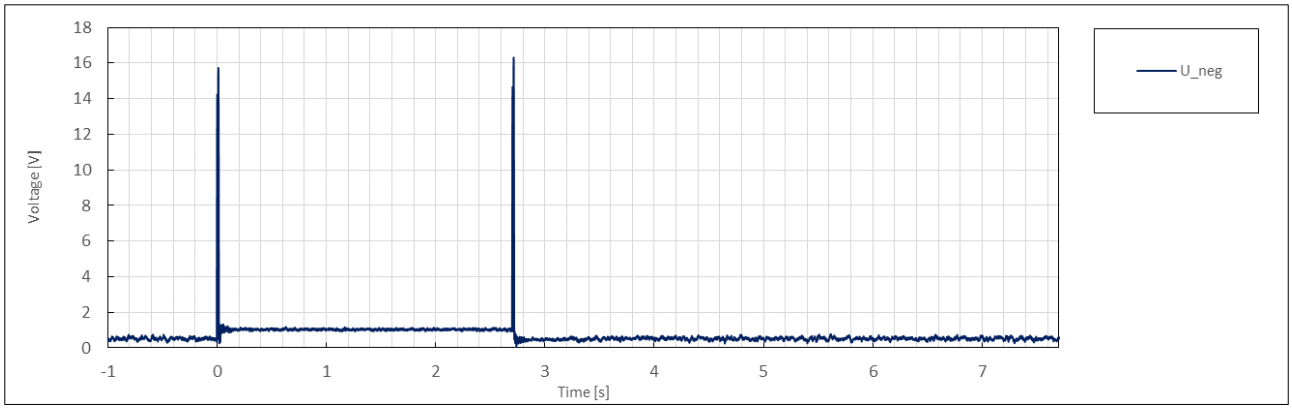


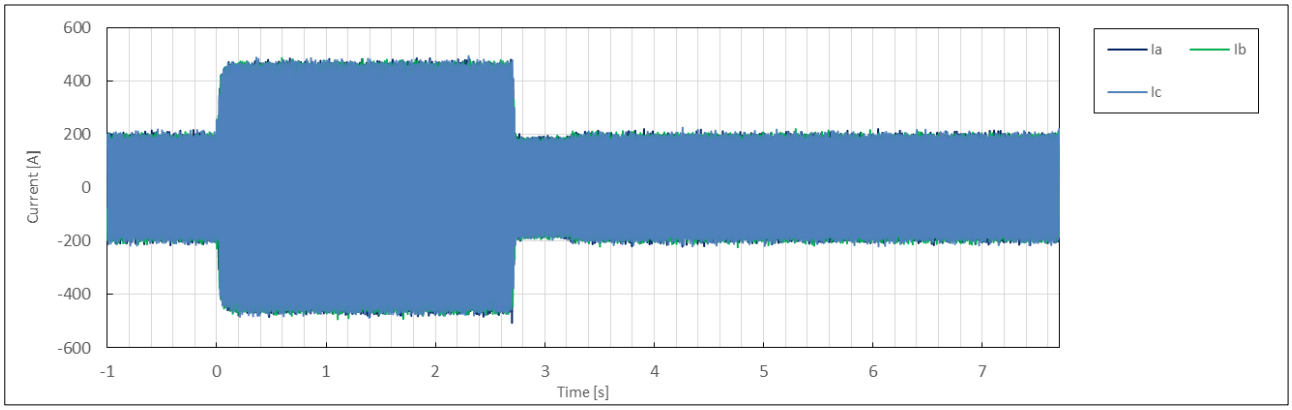
No. 4.6 Load Test

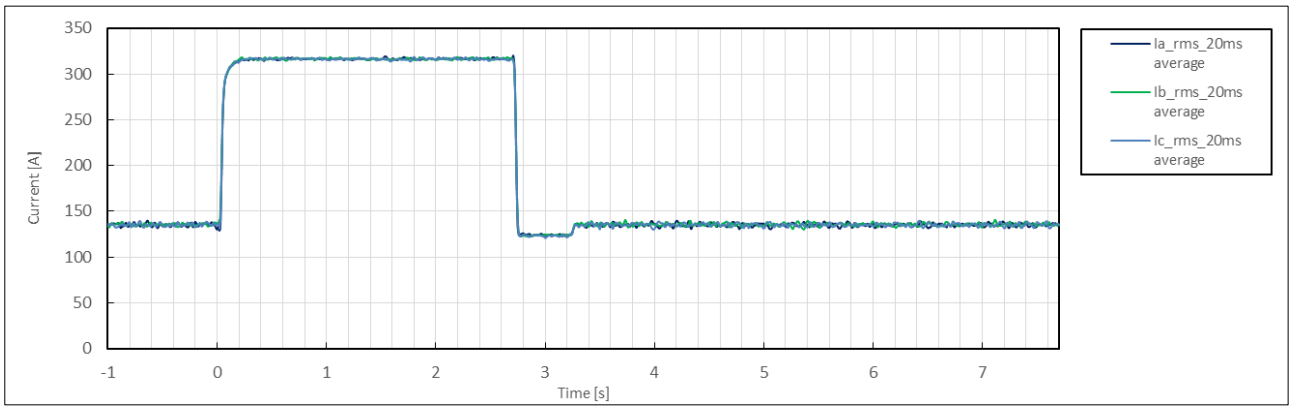


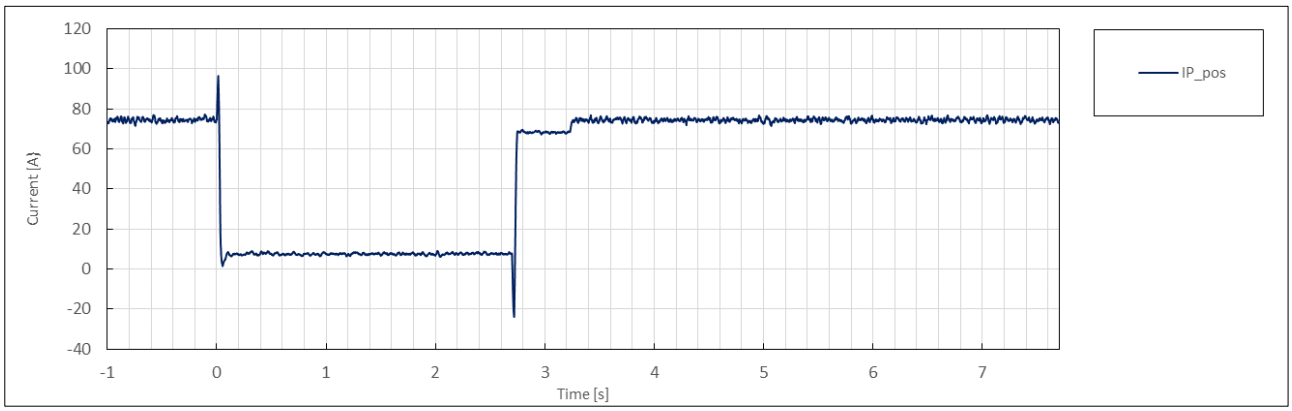


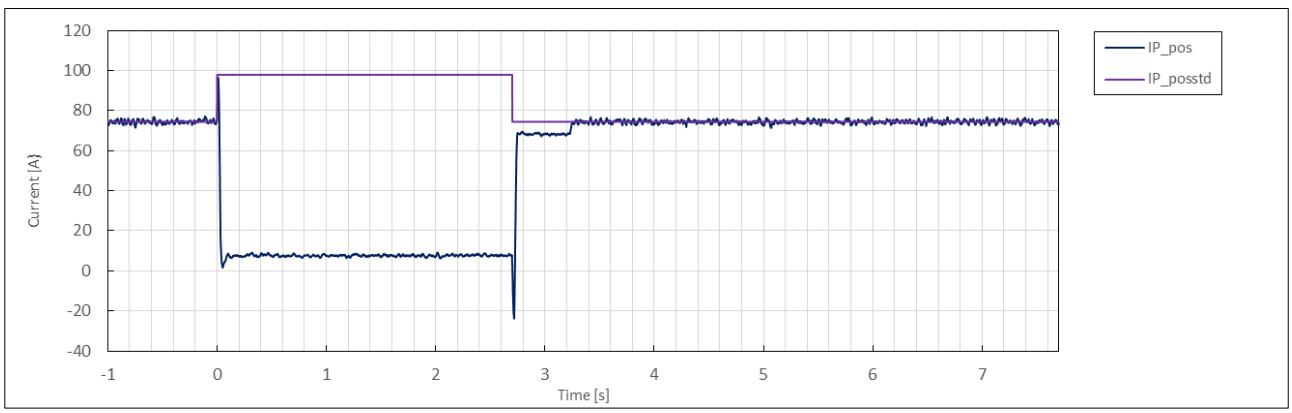


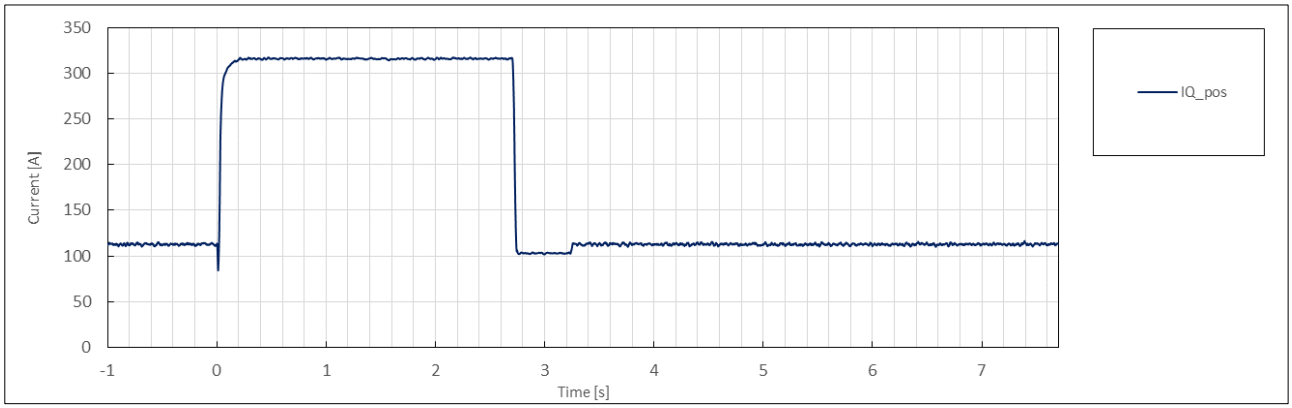


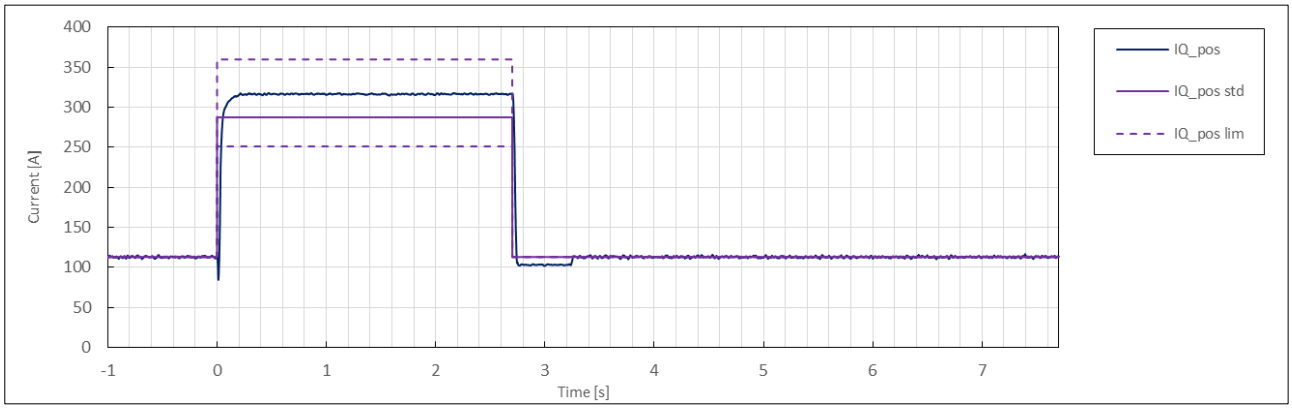

Current [A]
Time [s]
Ia
Ib
Ic

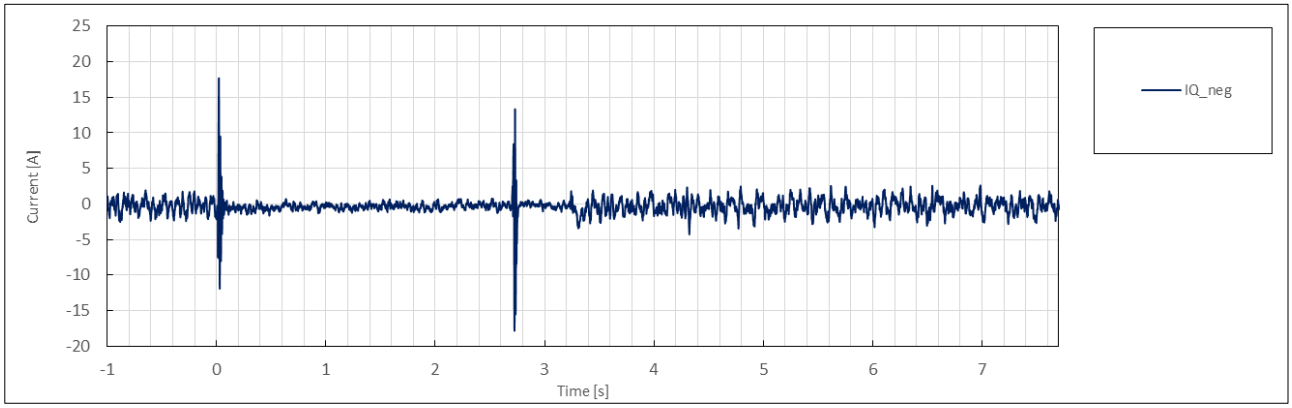

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

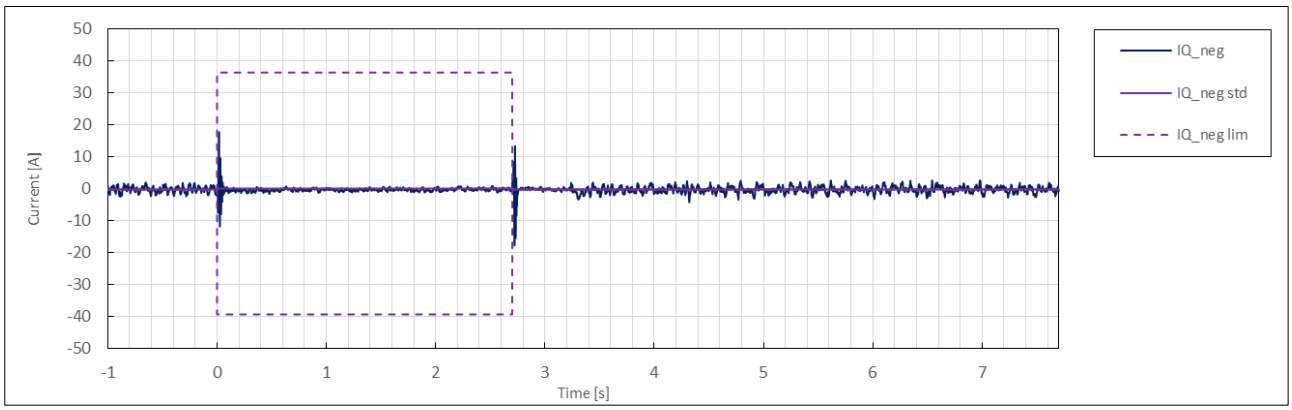

Current [A]
Time [s]
IP_pos

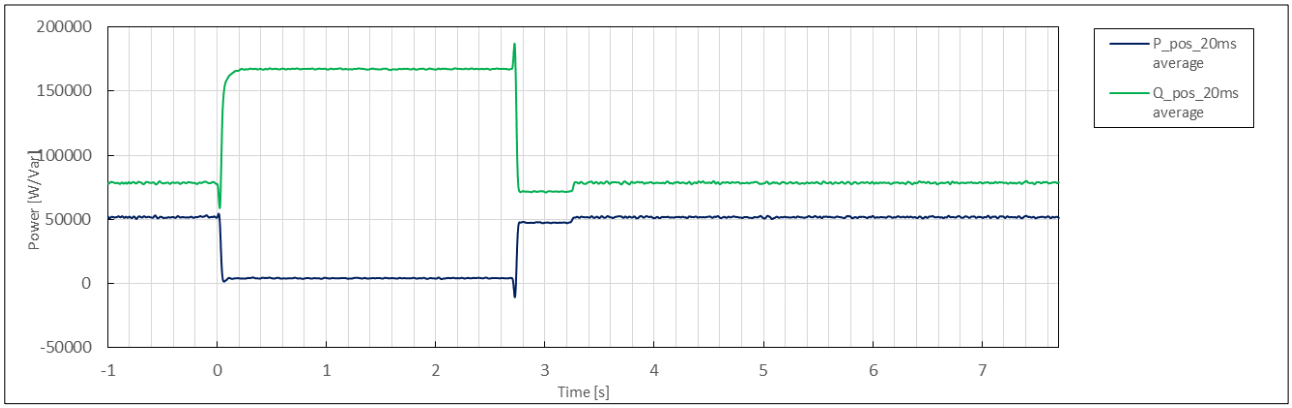

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

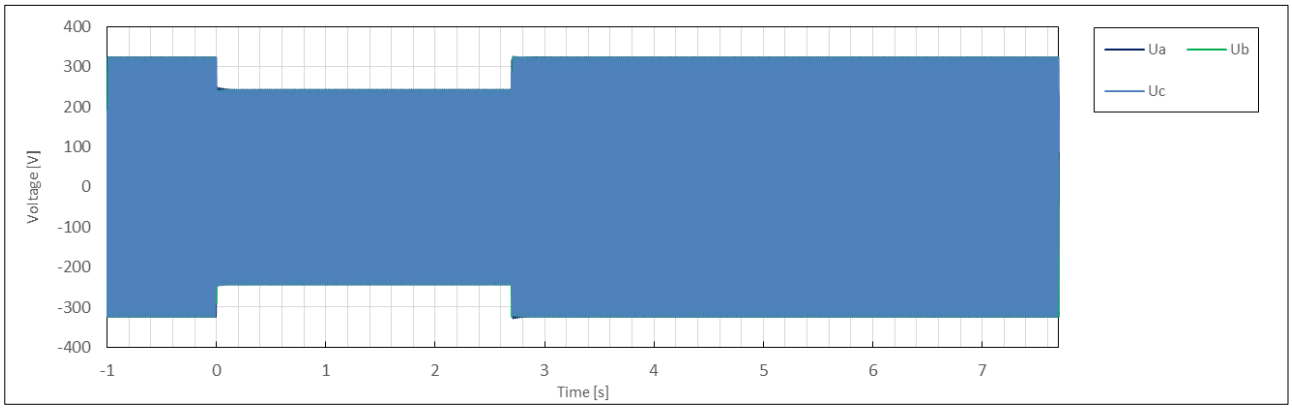

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

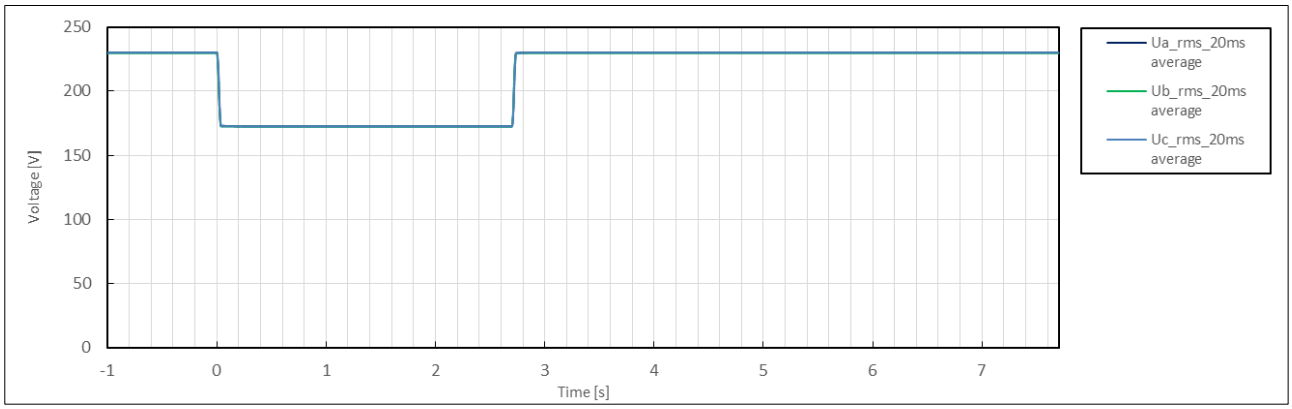

Current [A]
Time [s]
IQ_neg

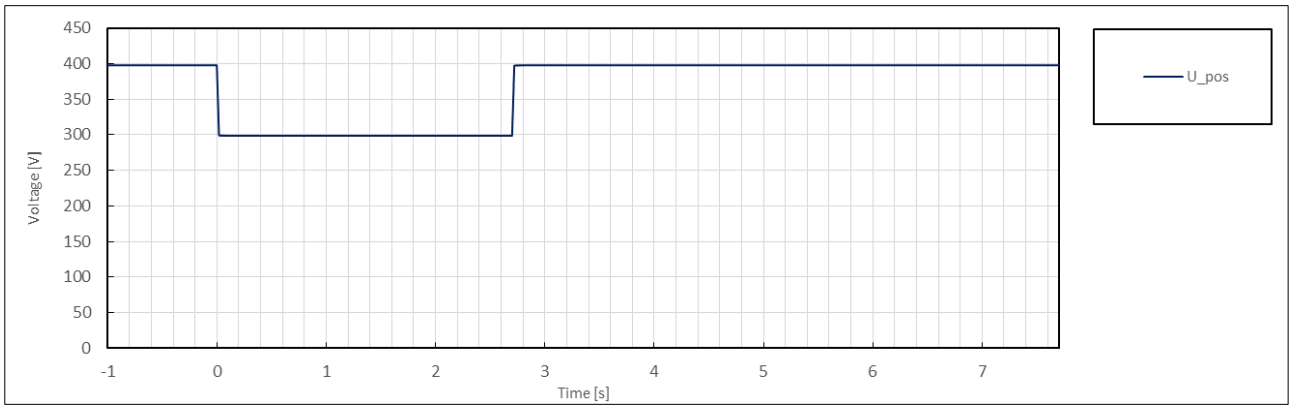

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
Time [s]
P_pos_20ms average
Q_pos_20ms average

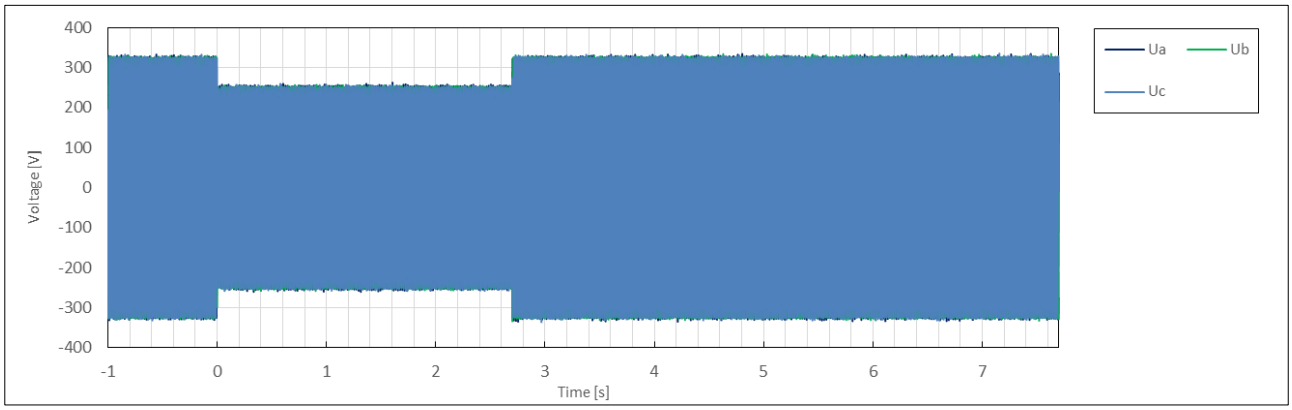
No. 4.7 Idle Test

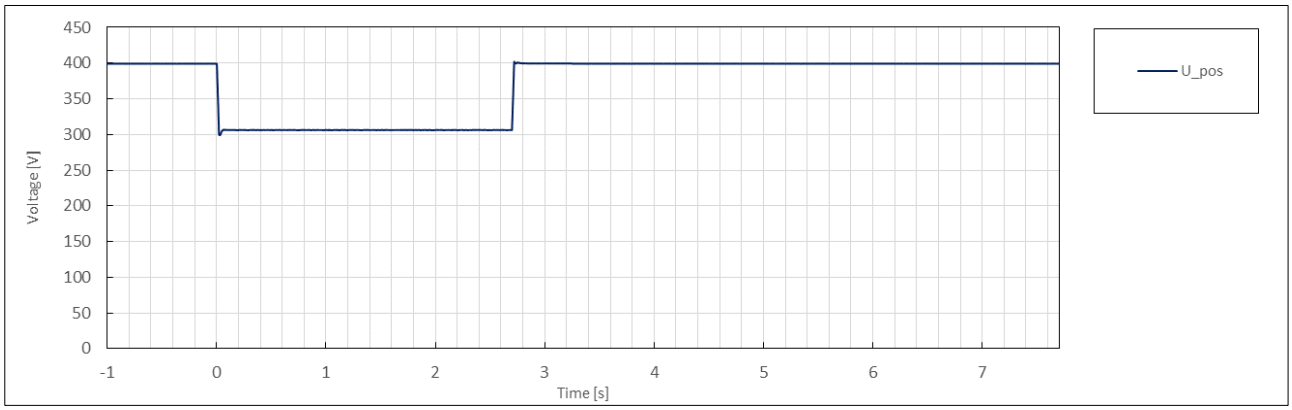


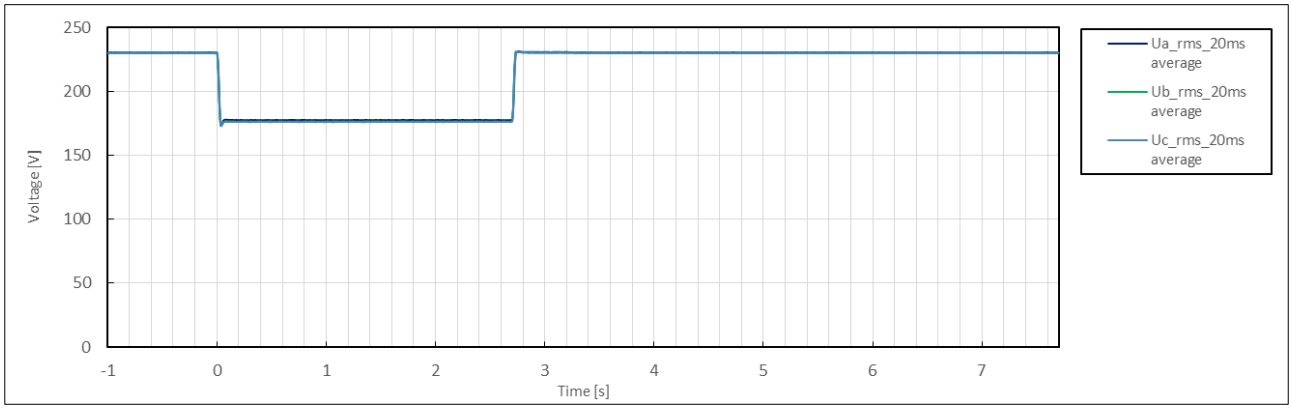


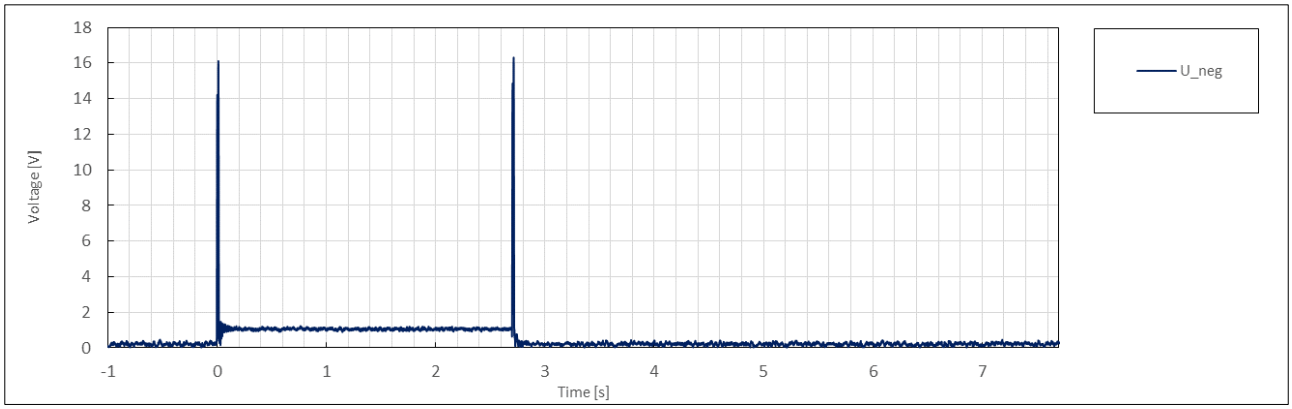


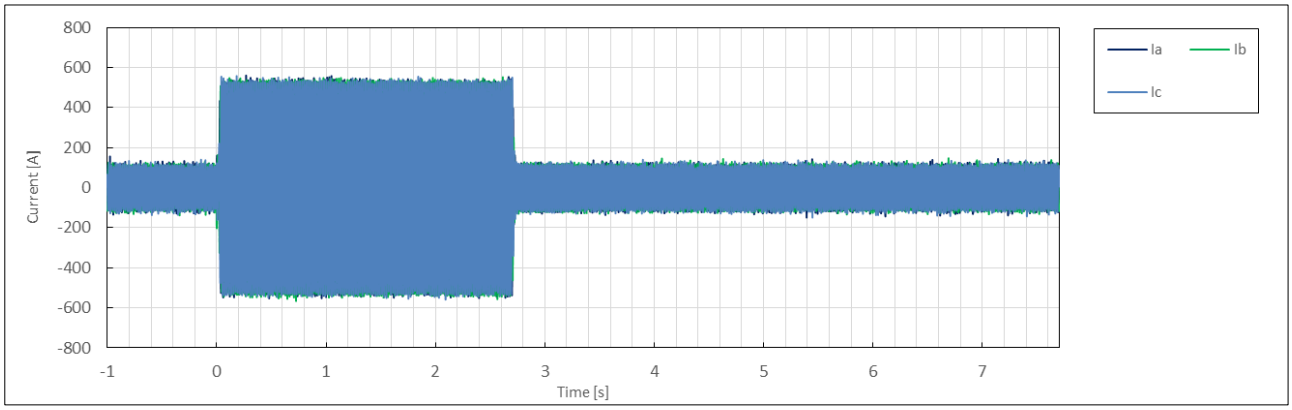
No. 4.7 Load Test

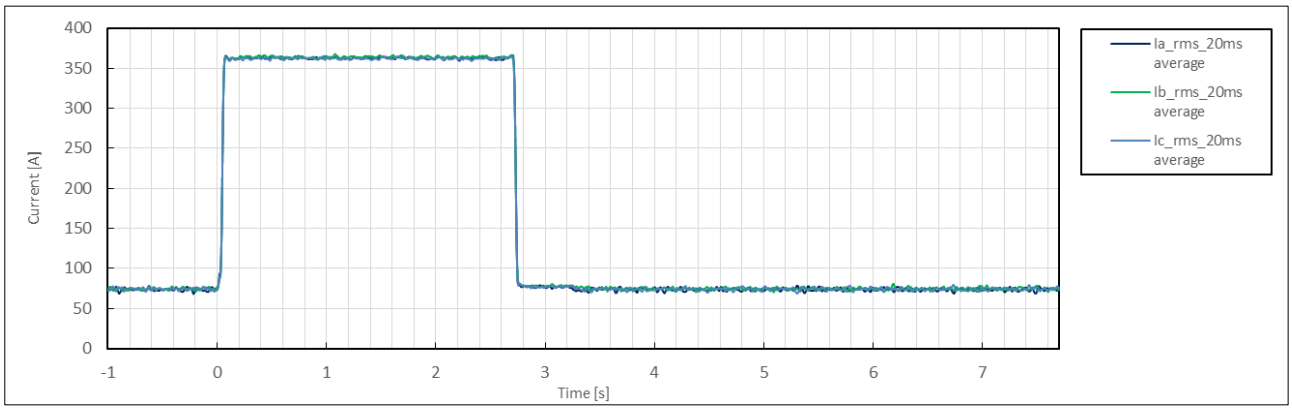


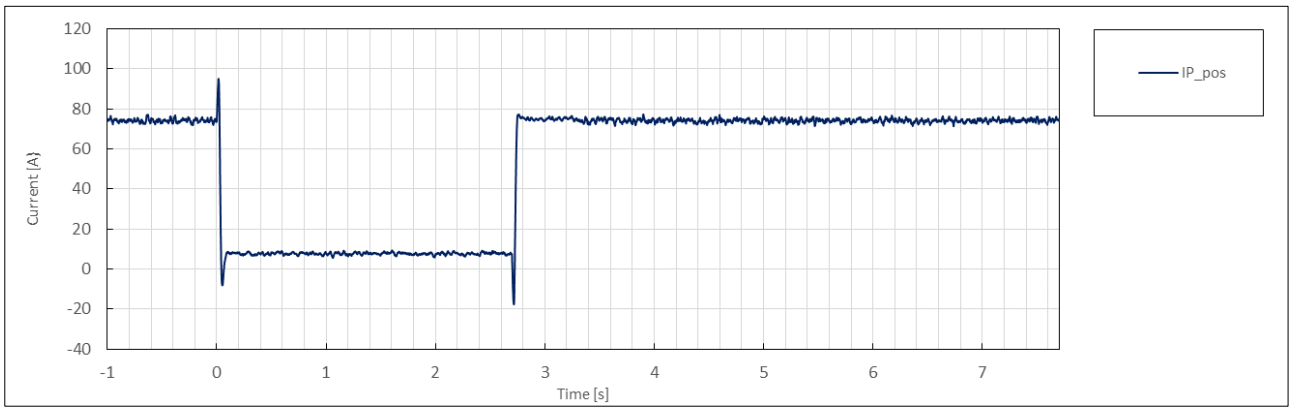


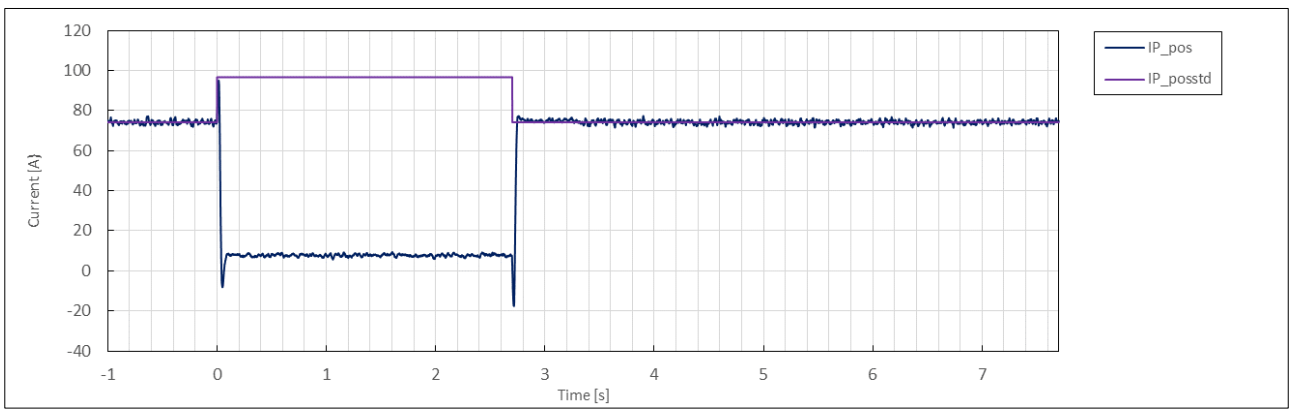


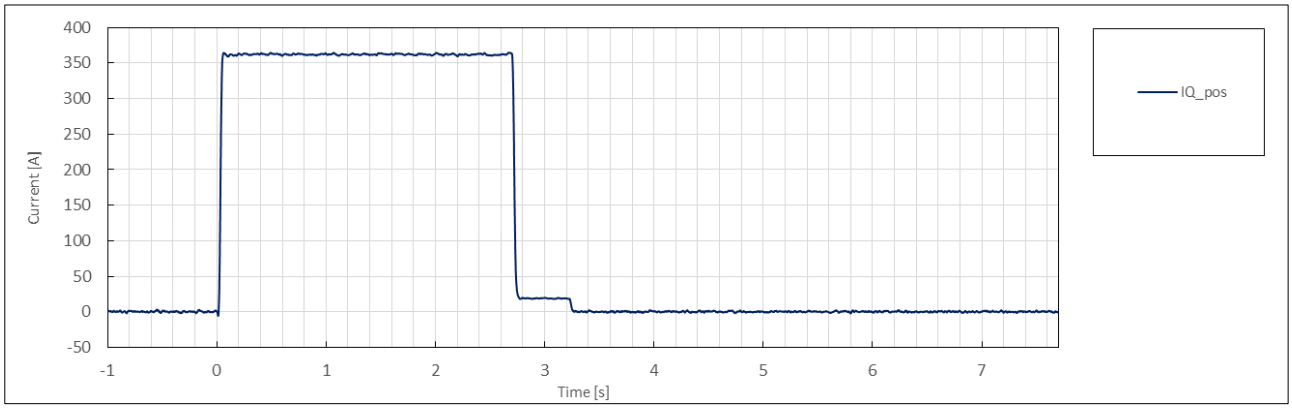


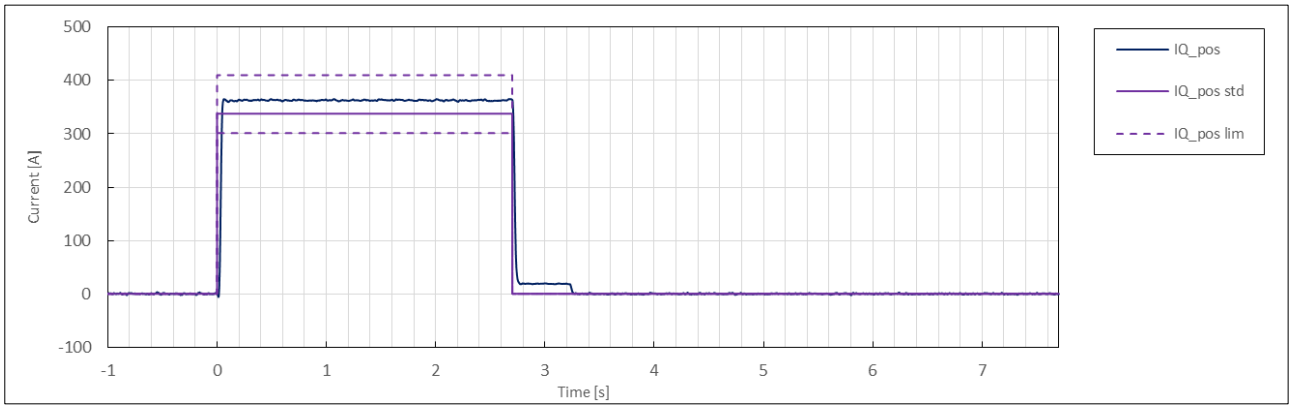

Current [A]
Time [s]
Ia
Ib
Ic

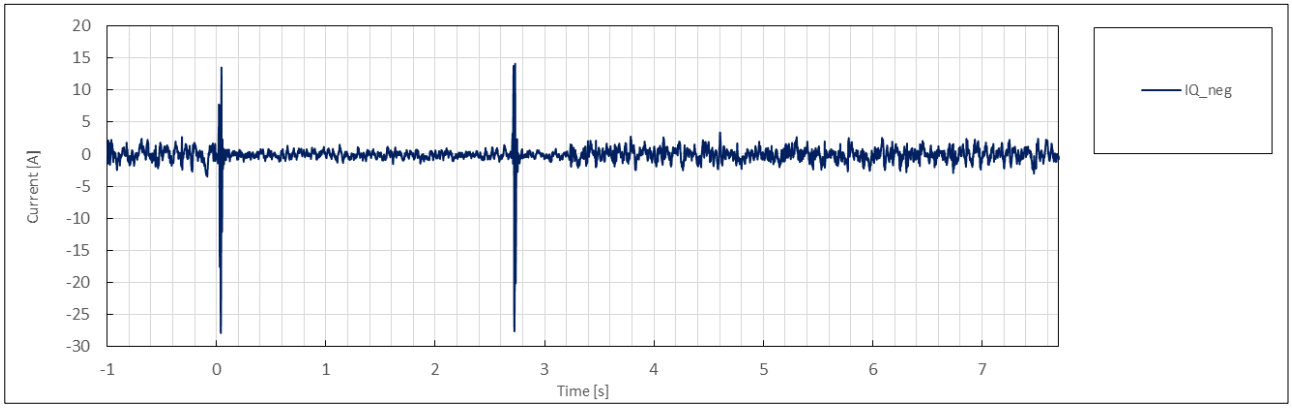

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

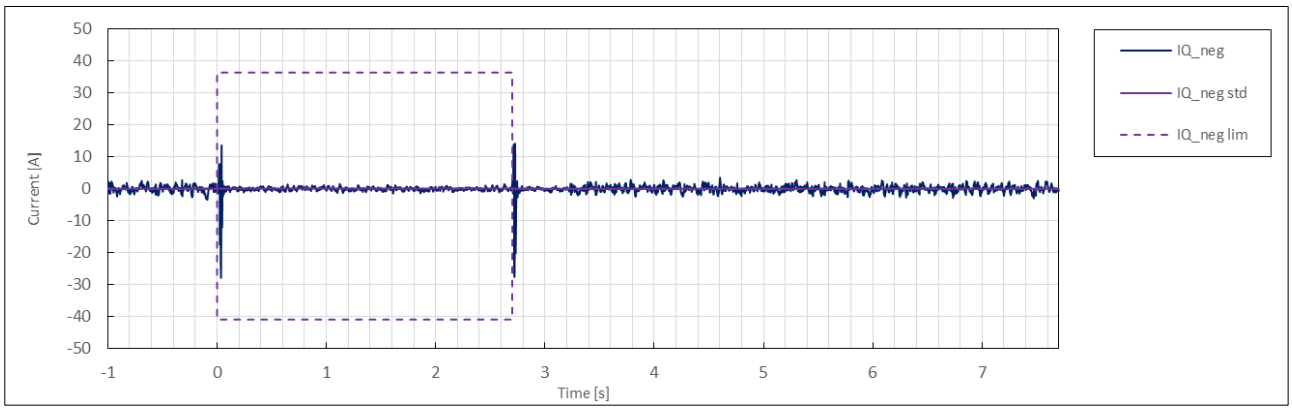

Current [A]
Time [s]
IP_pos

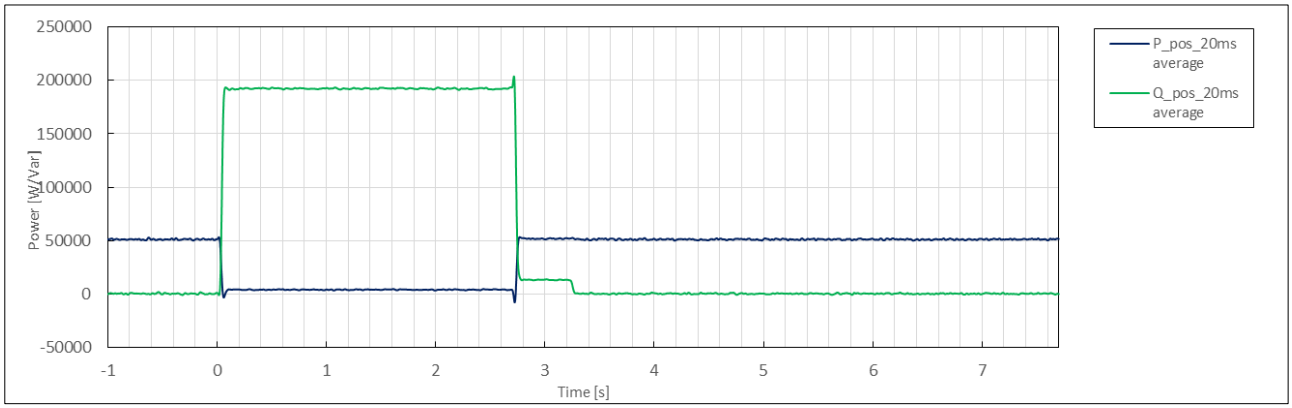

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

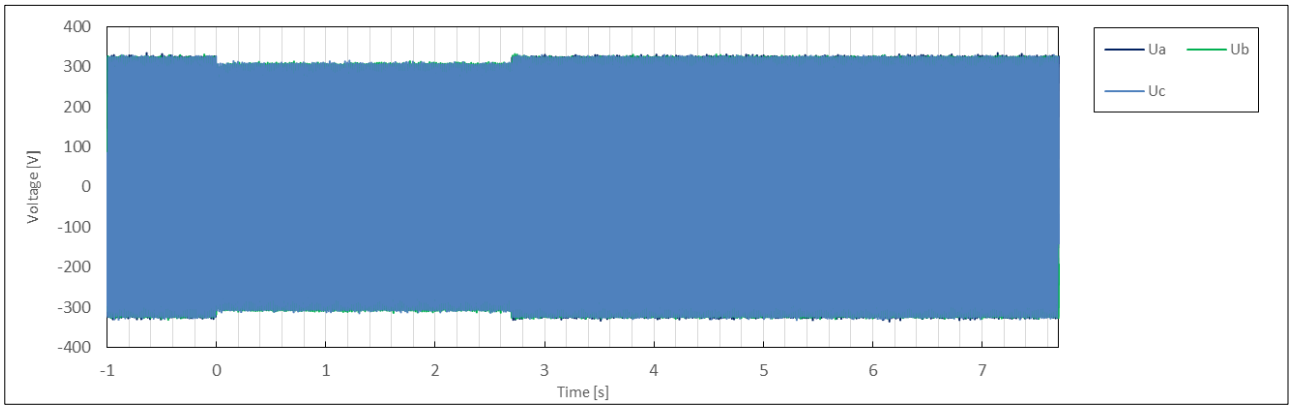

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

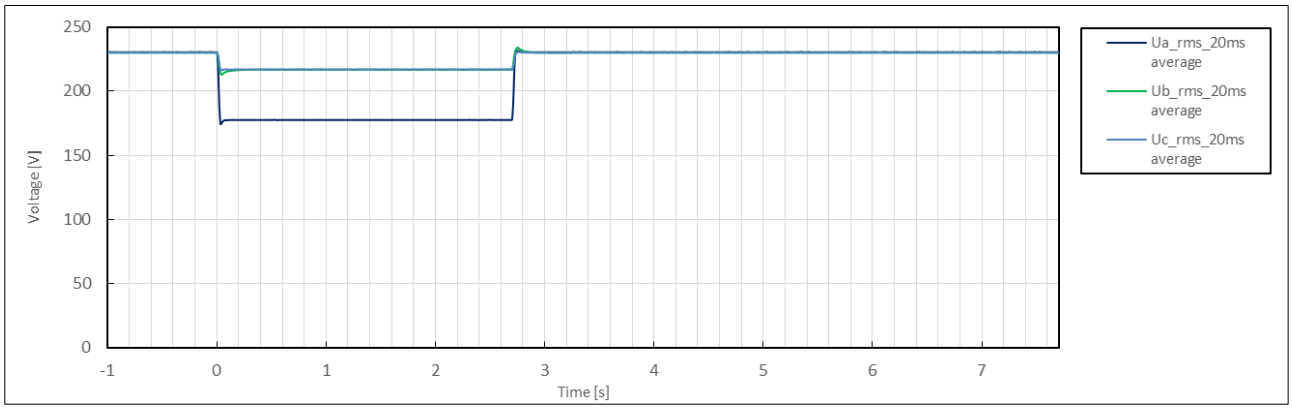

Current [A]
Time [s]
IQ_neg

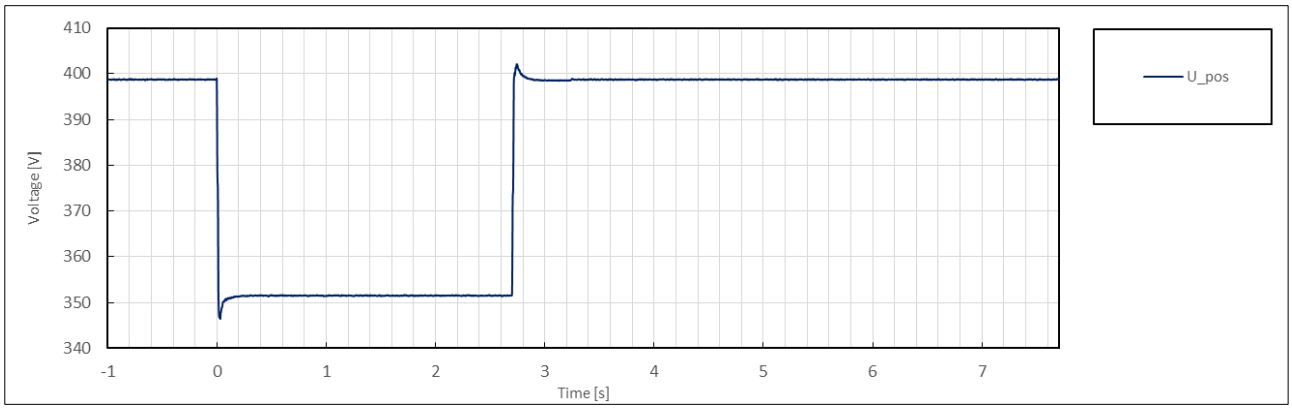

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
Time [s]
P_pos_20ms average
Q_pos_20ms average

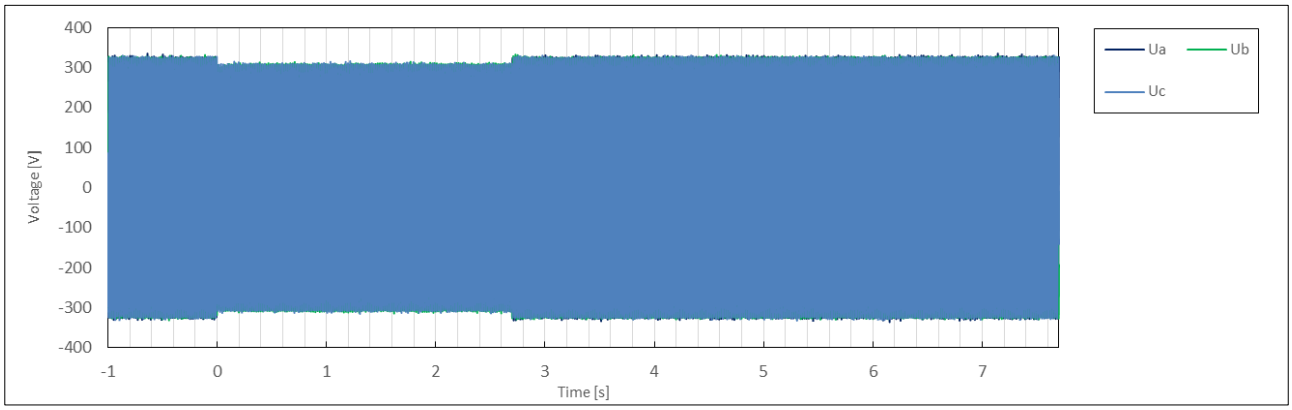
No. 4.8 Idle Test

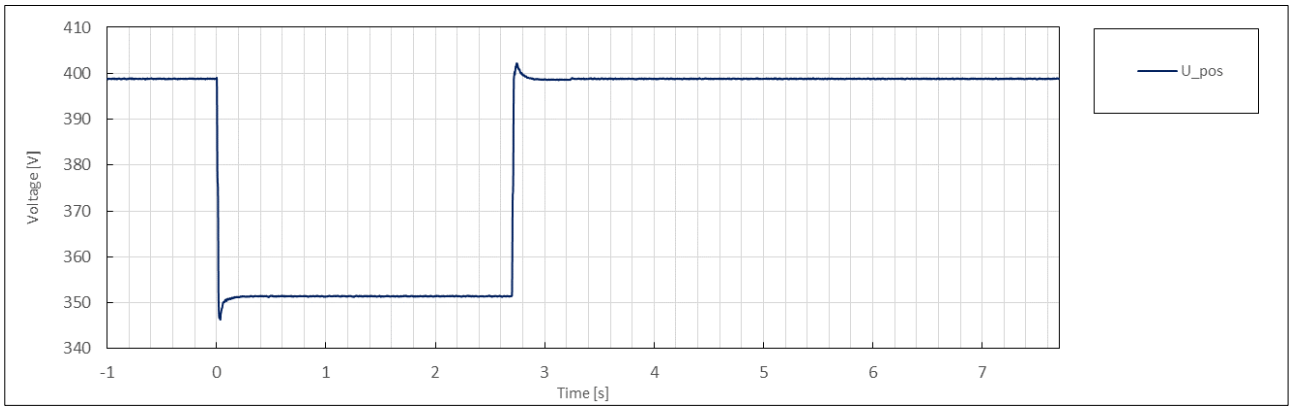


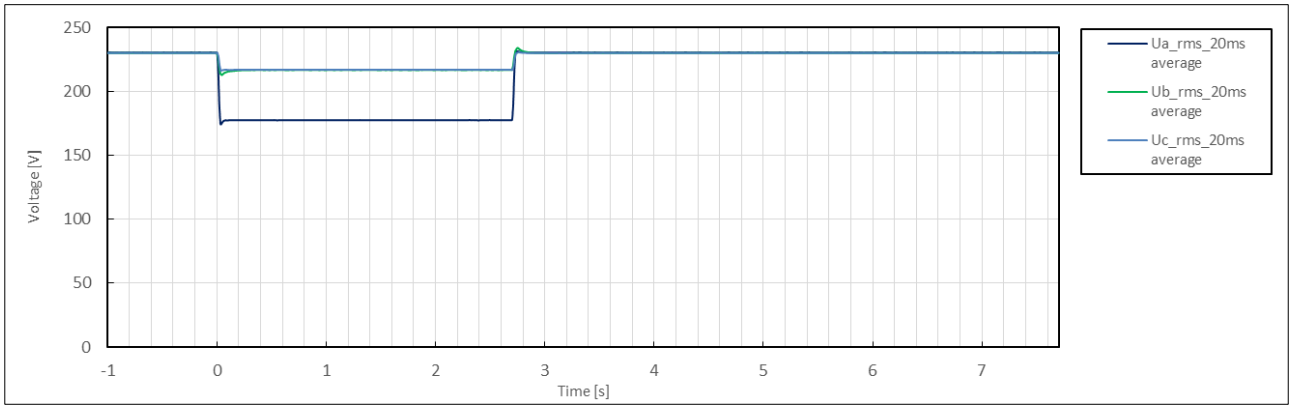


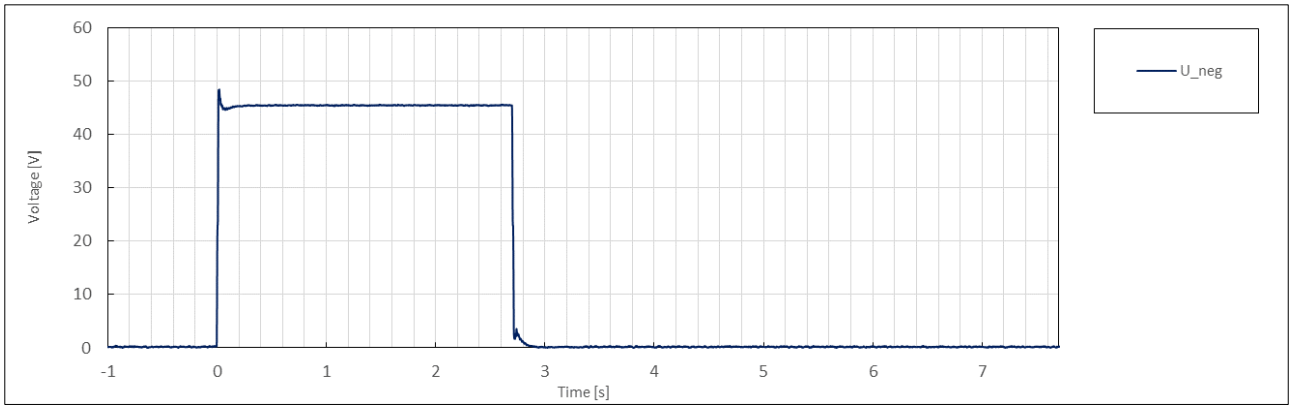


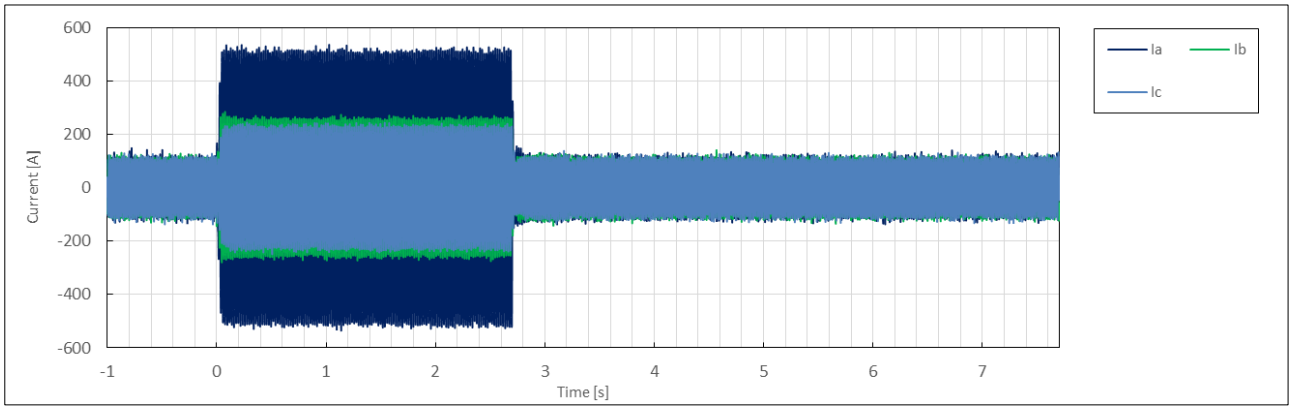
No. 4.8 Load Test

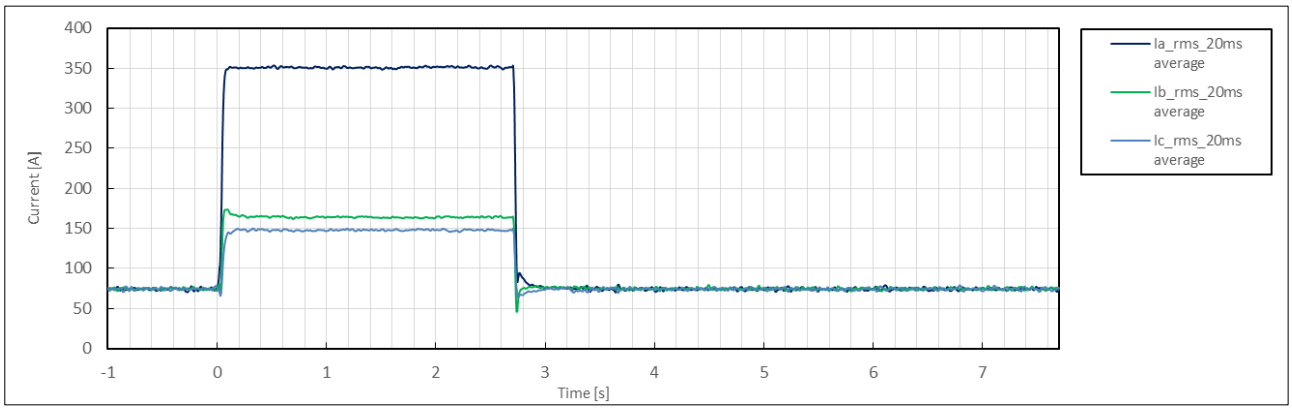


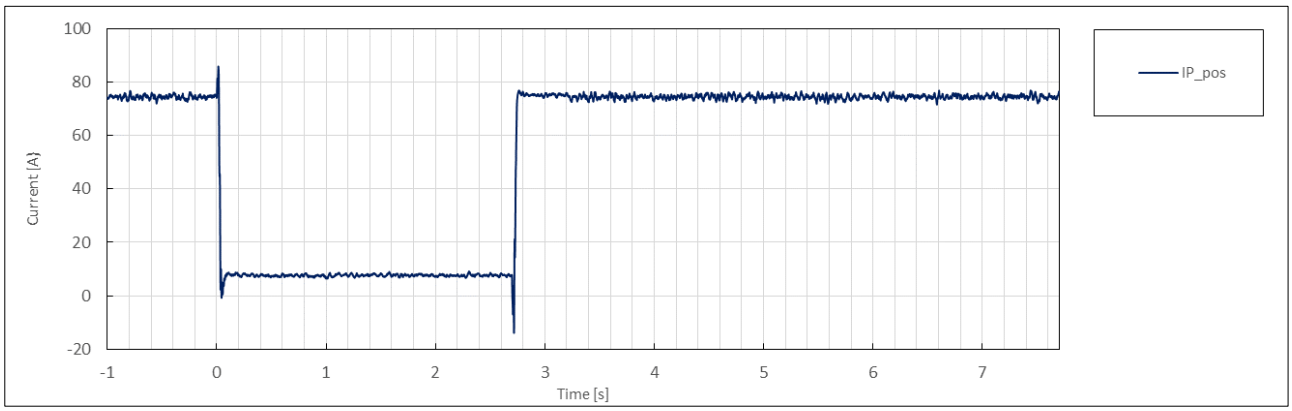


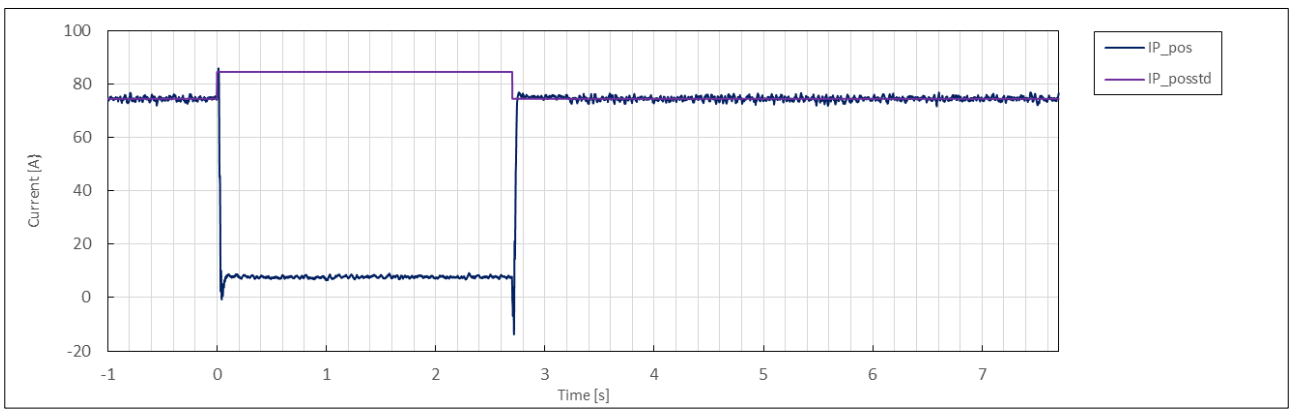


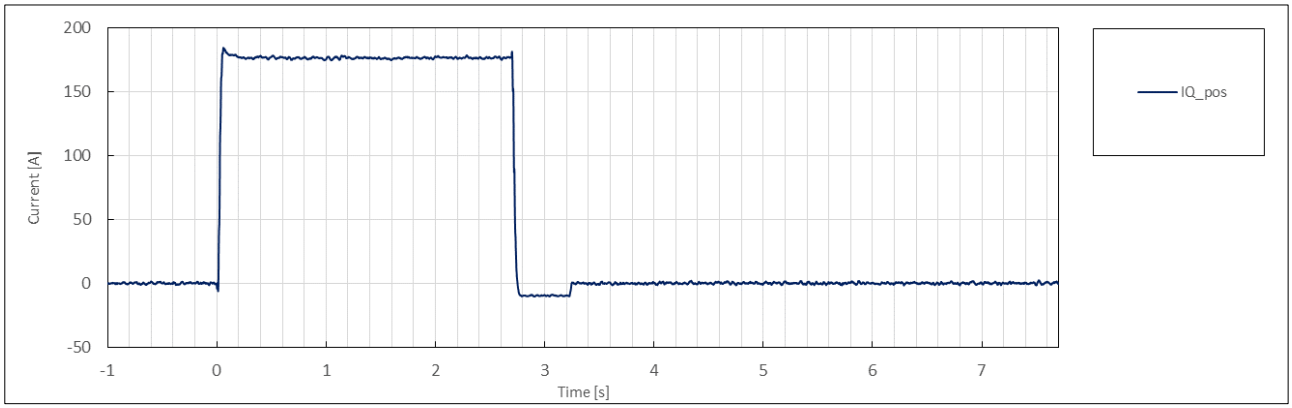


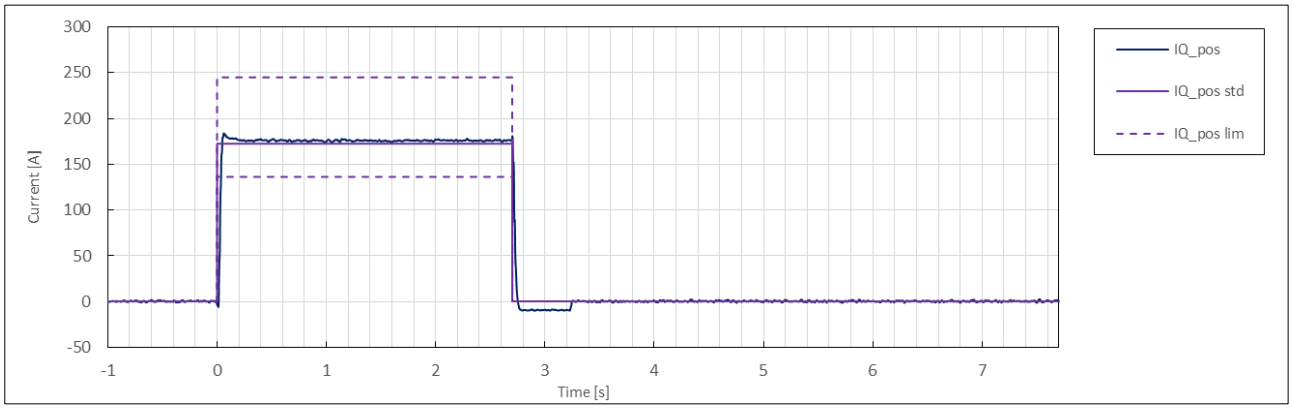

Current [A]
Time [s]
Ia
Ib
Ic

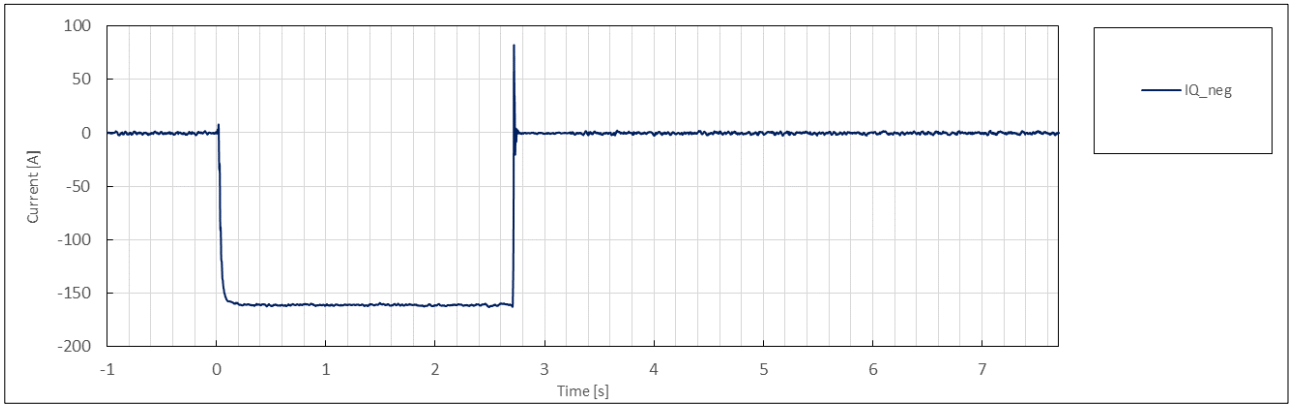

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

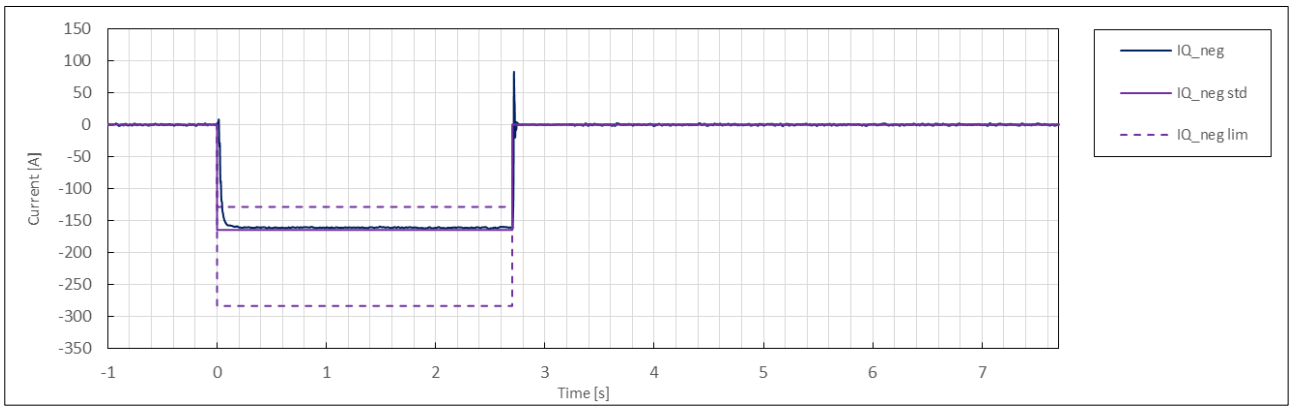

Current [A]
Time [s]
IP_pos

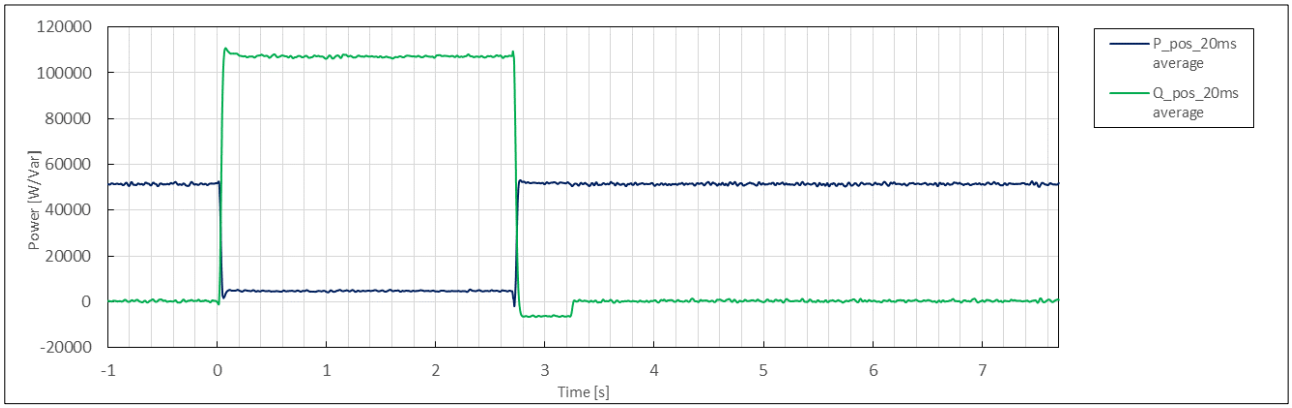

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

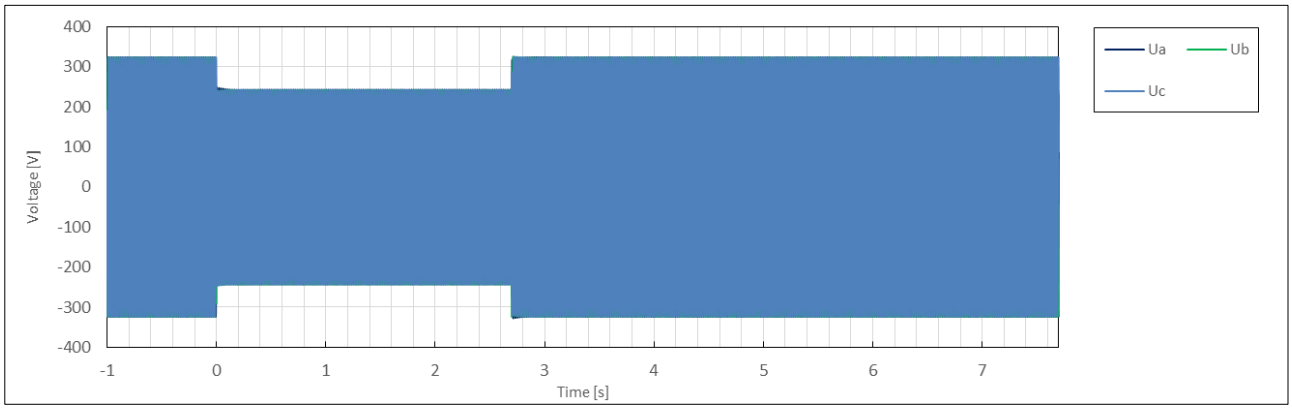

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

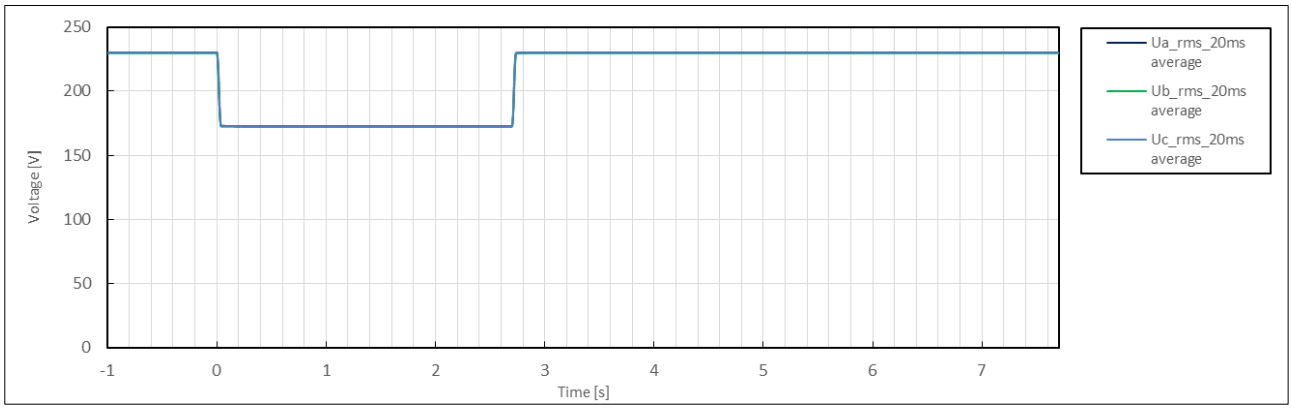

Current [A]
Time [s]
IQ_neg

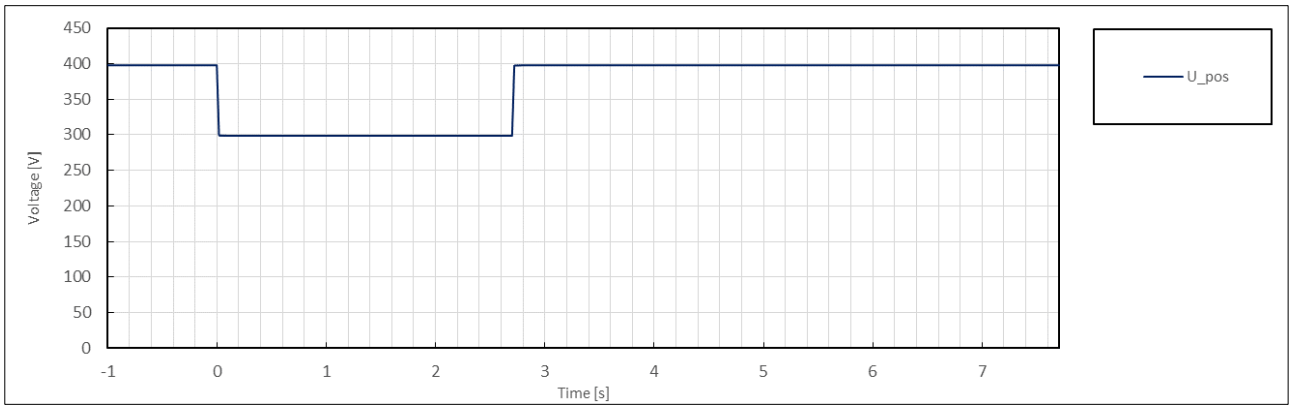

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


120000
100000
80000
60000
40000
20000
0
-20000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
Time [s]
P_pos_20ms average
Q_pos_20ms average

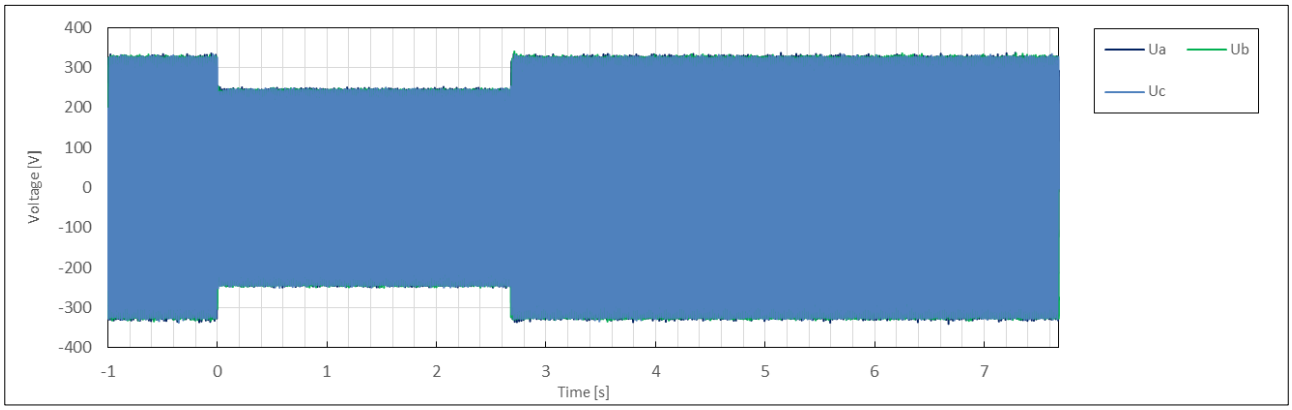
No. 4.9 Idle Test

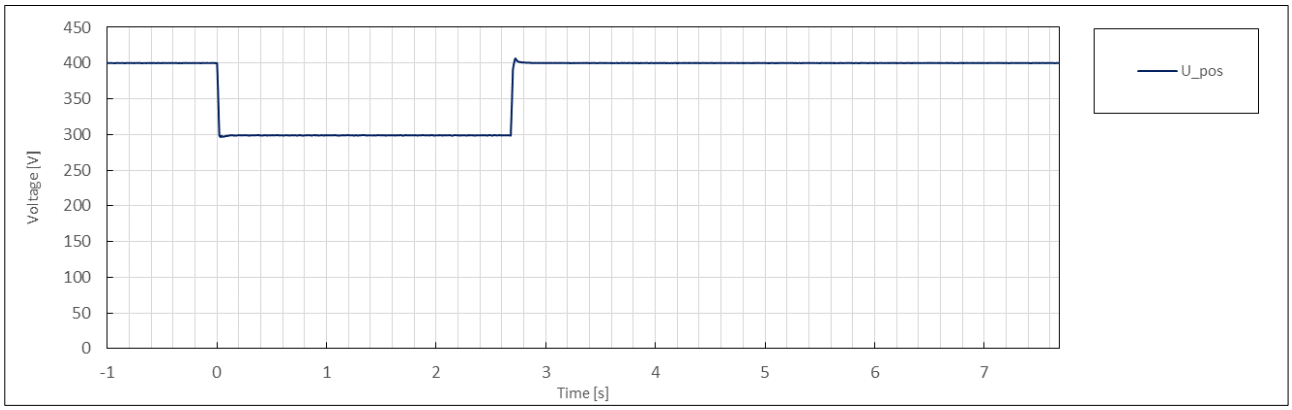


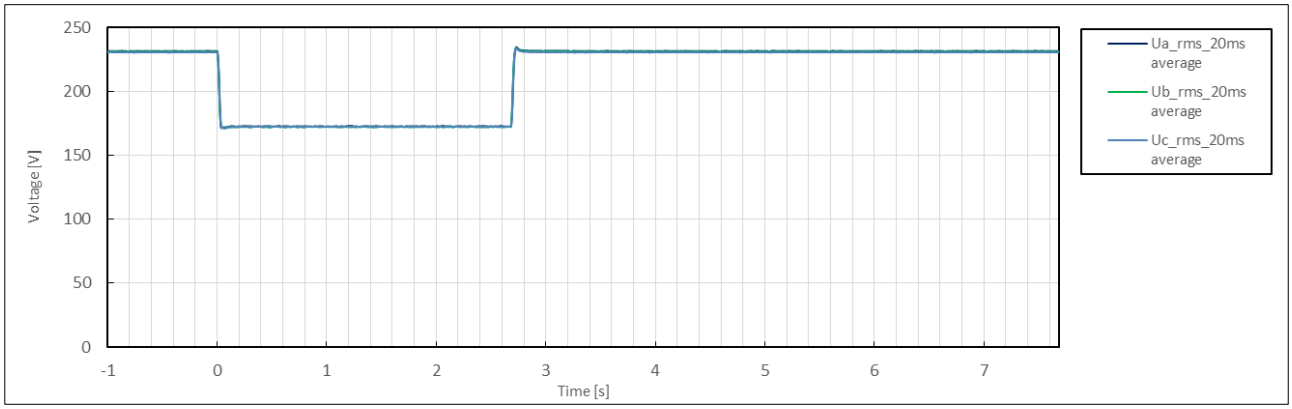


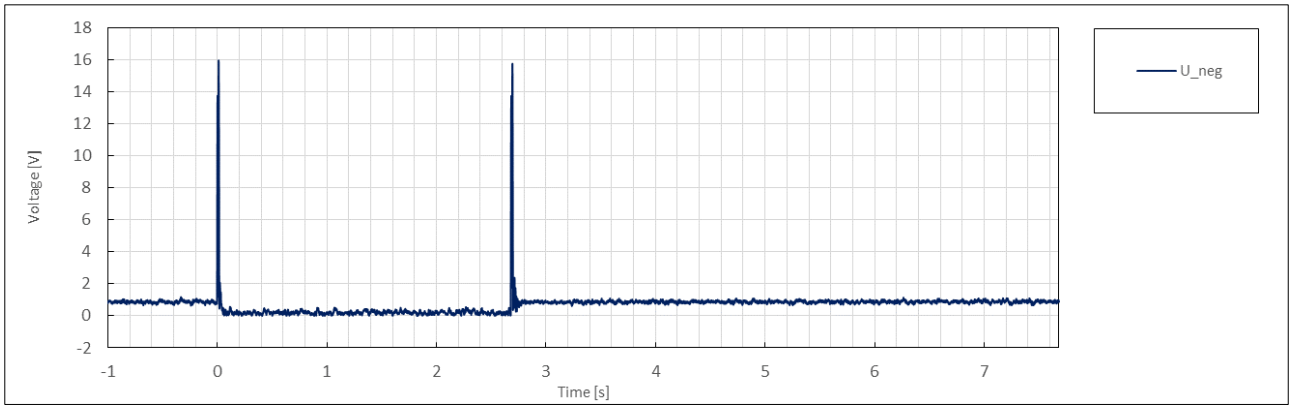


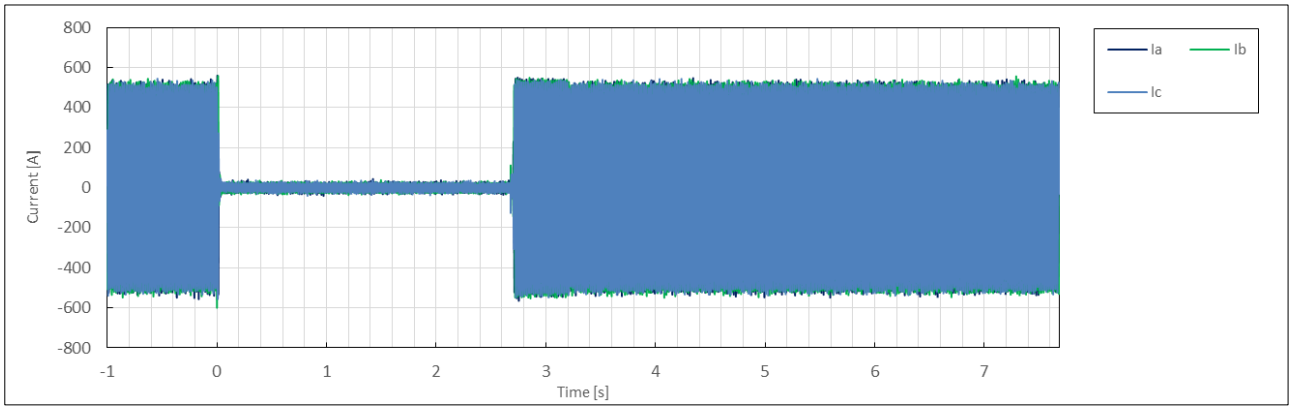
No. 4.9 Load Test

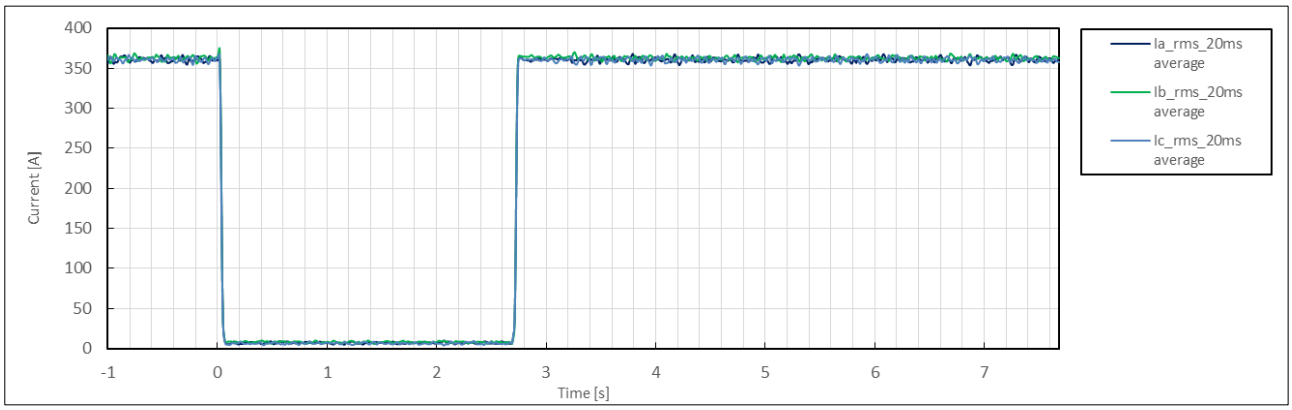


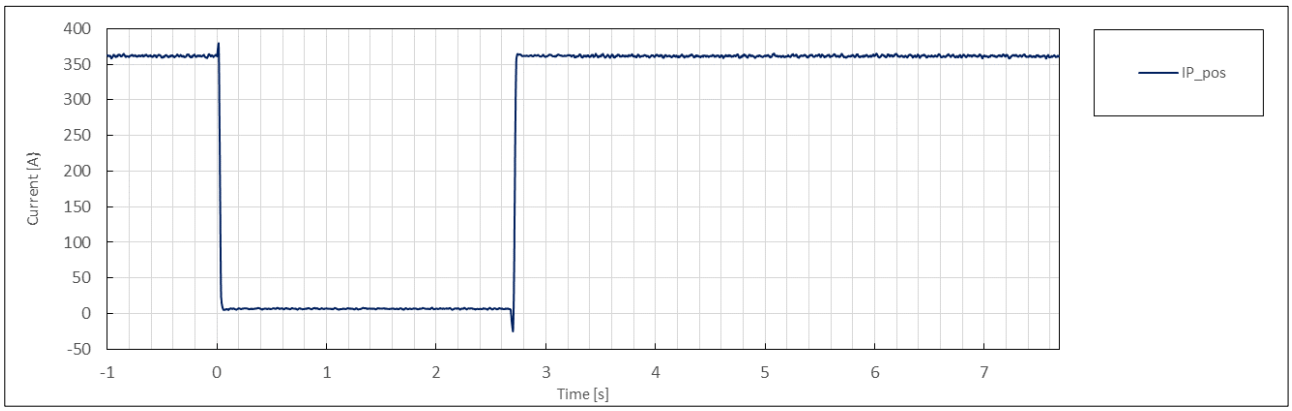


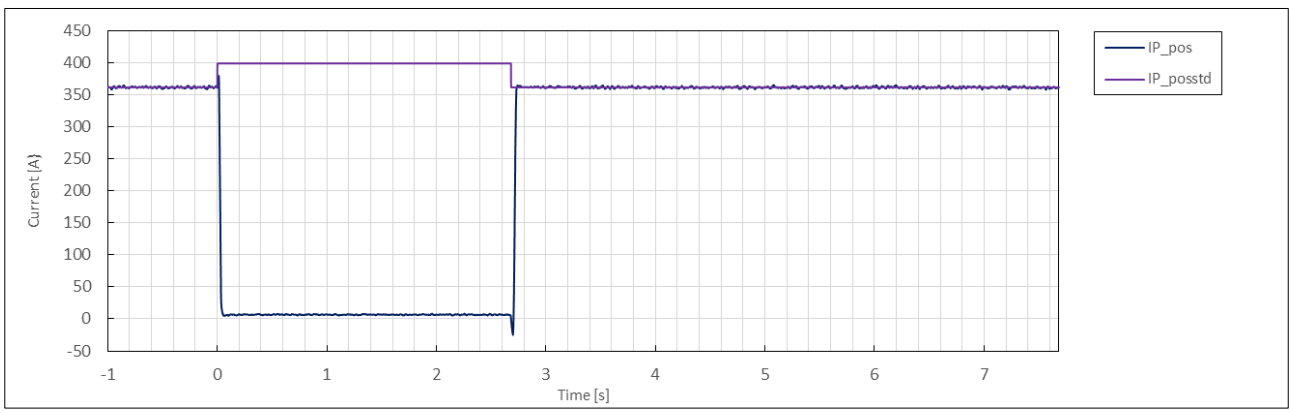


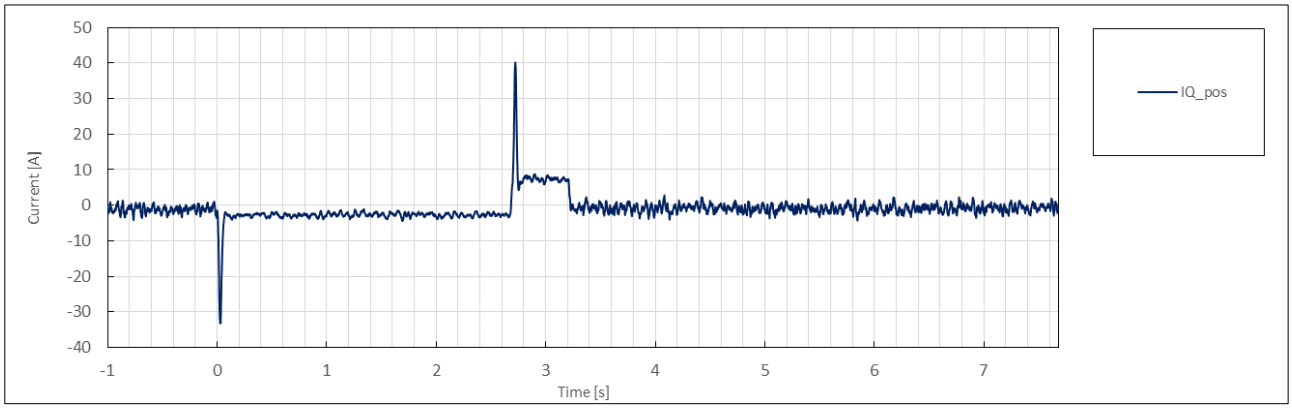


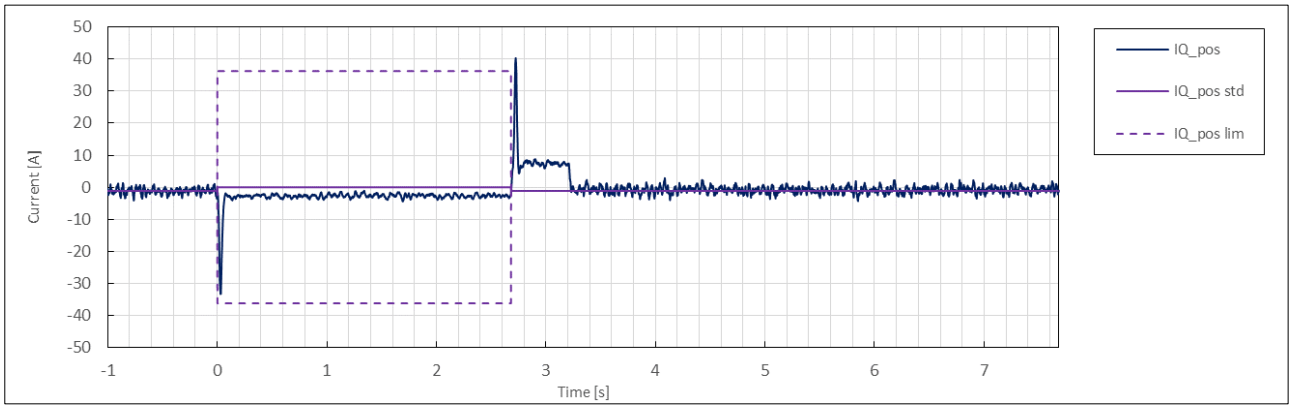

Current [A]
Time [s]
Ia
Ib
Ic

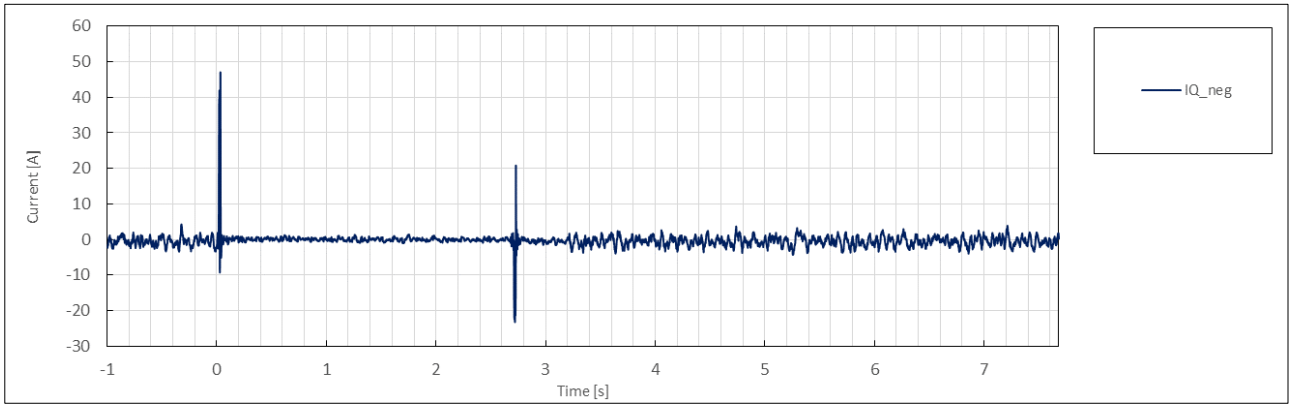

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

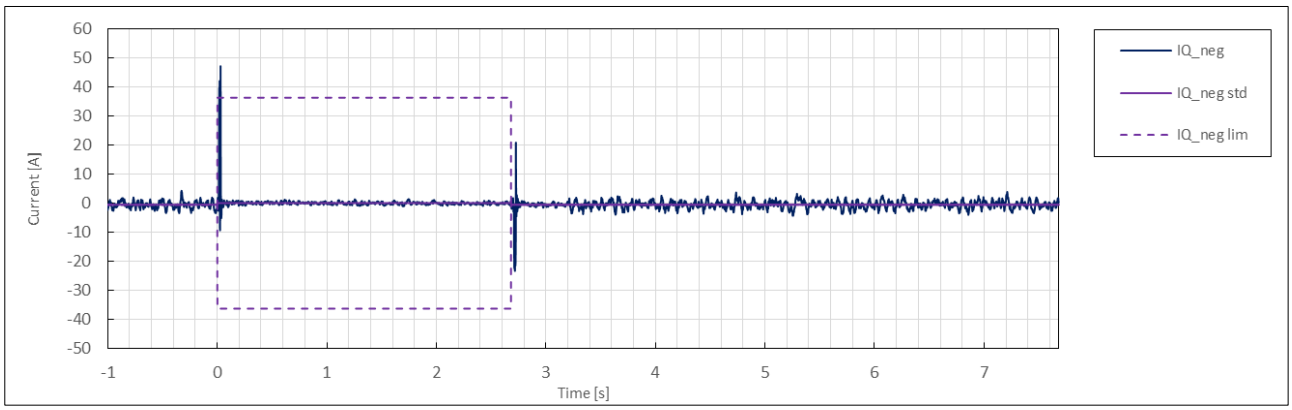

Current [A]
Time [s]
IP_pos

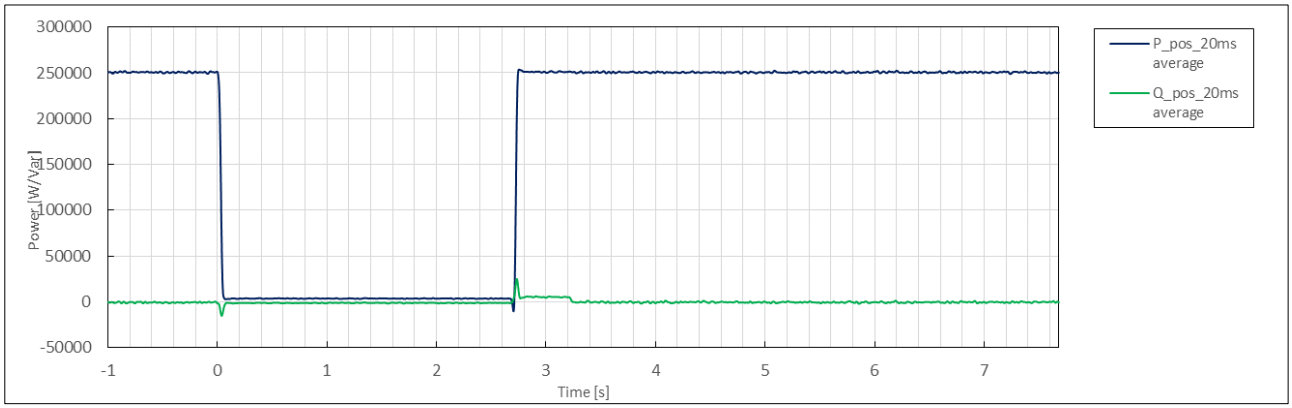

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

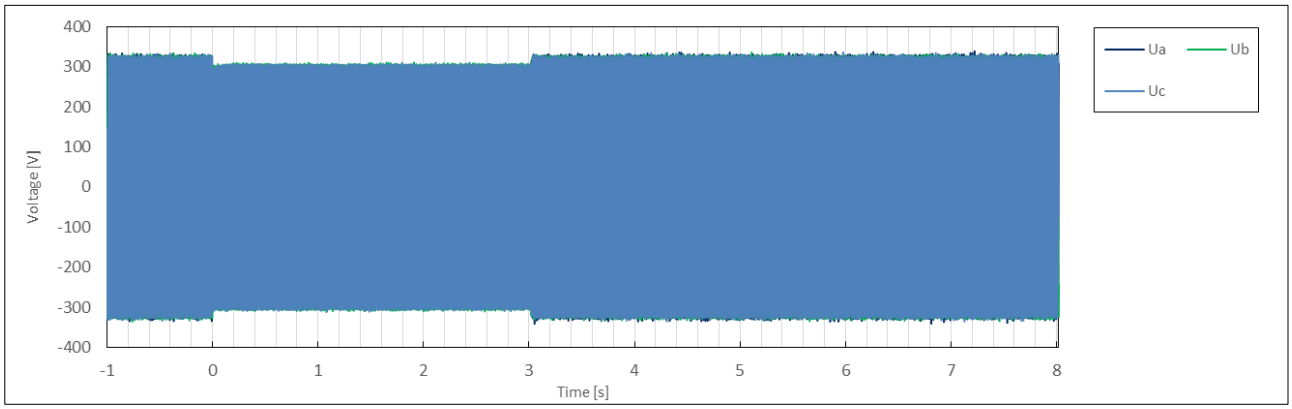

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

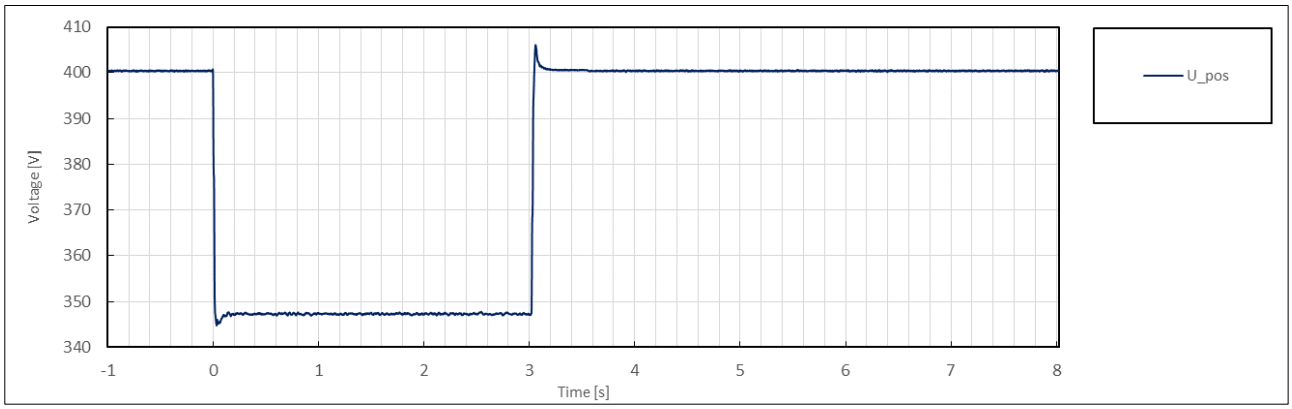

Current [A]
Time [s]
IQ_neg

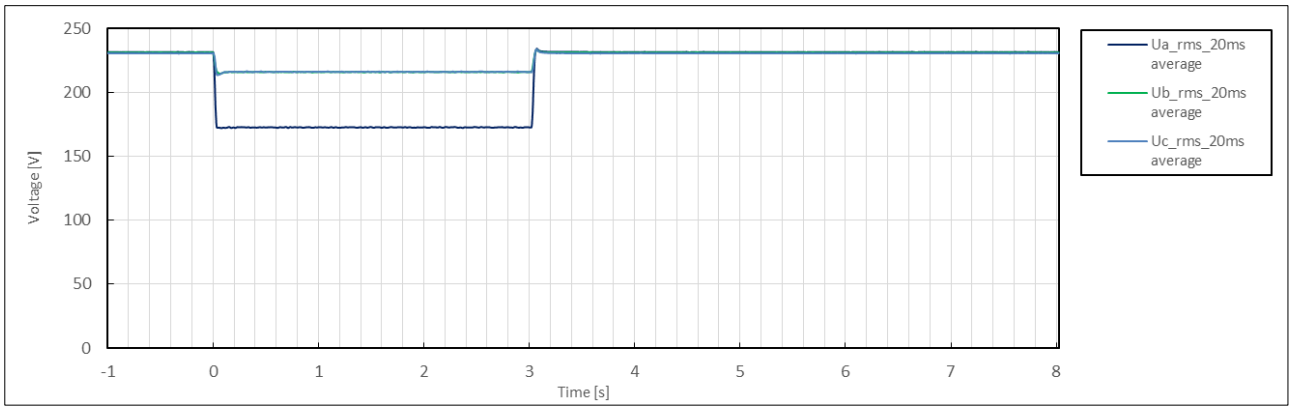

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
0
1
2
3
4
5
6
7
Time [s]
P_pos_20ms average
Q_pos_20ms average

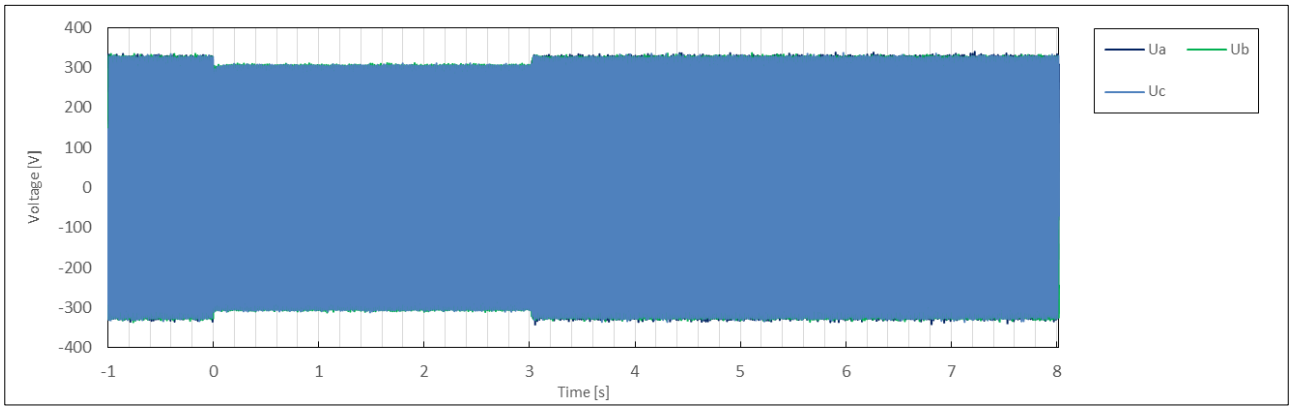
No. 4.10 Idle Test

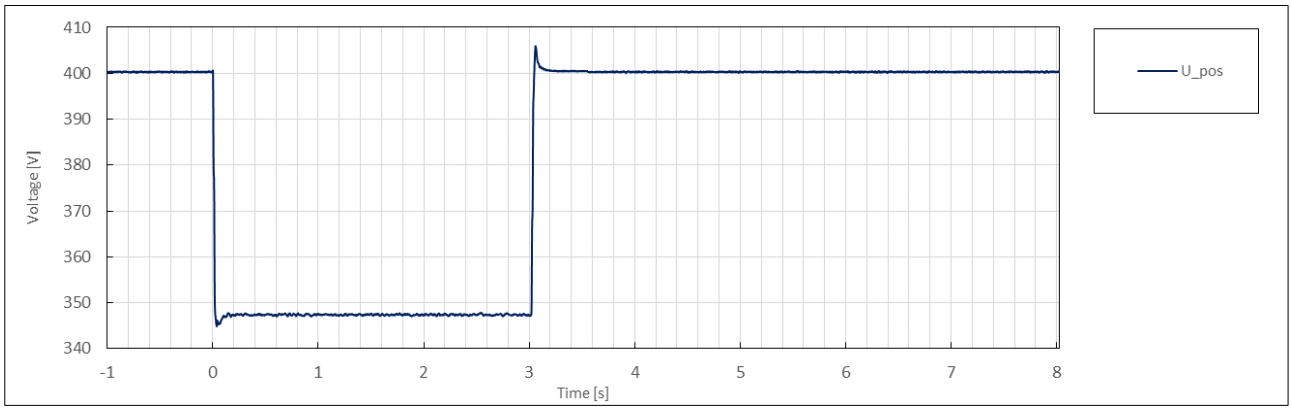


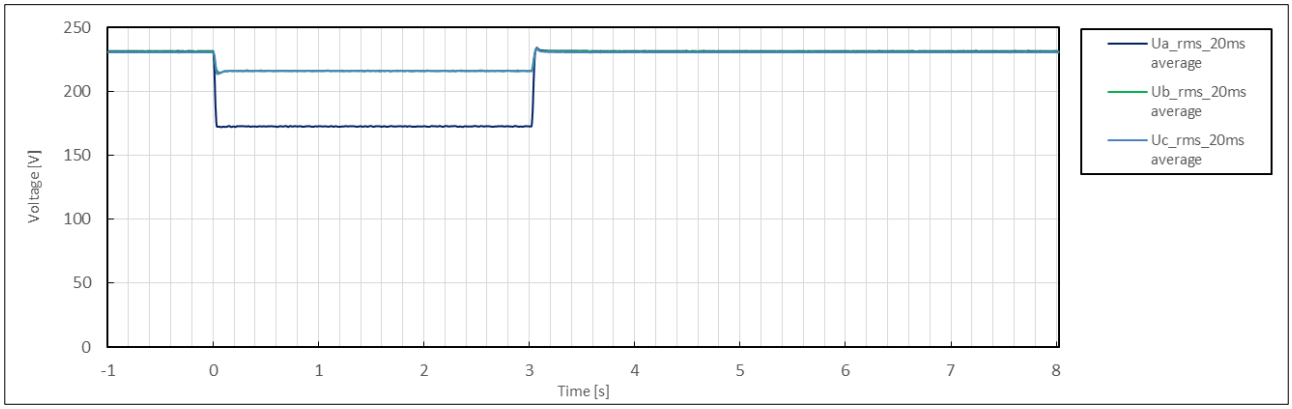


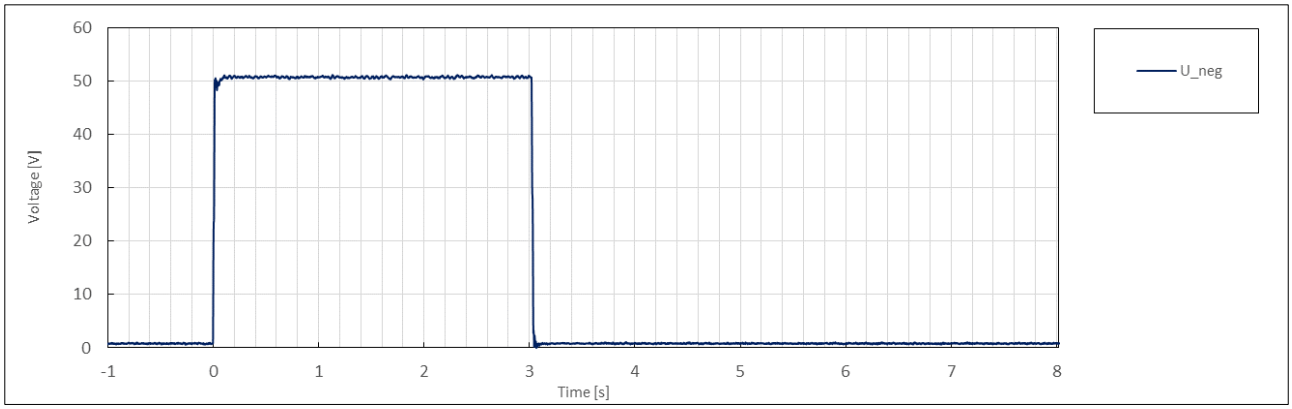


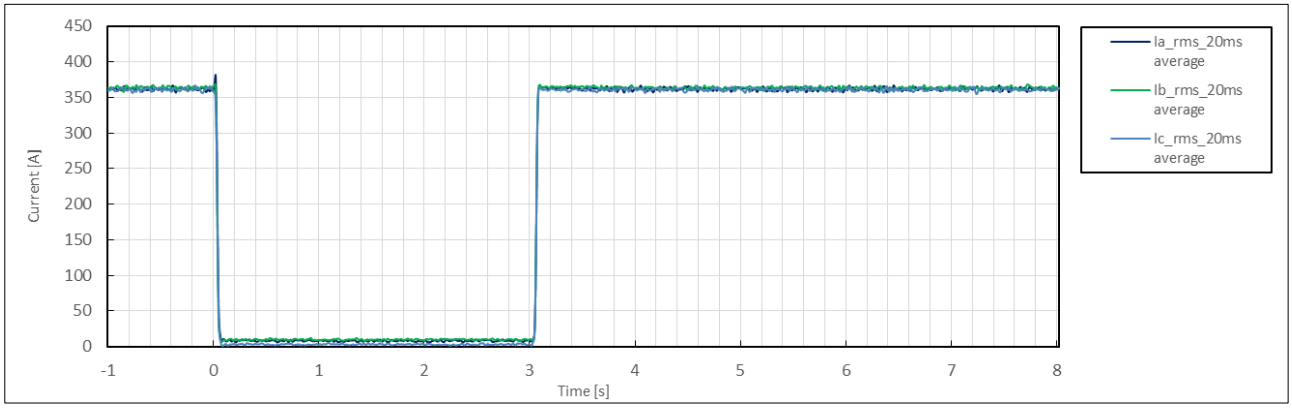
No. 4.10 Load Test

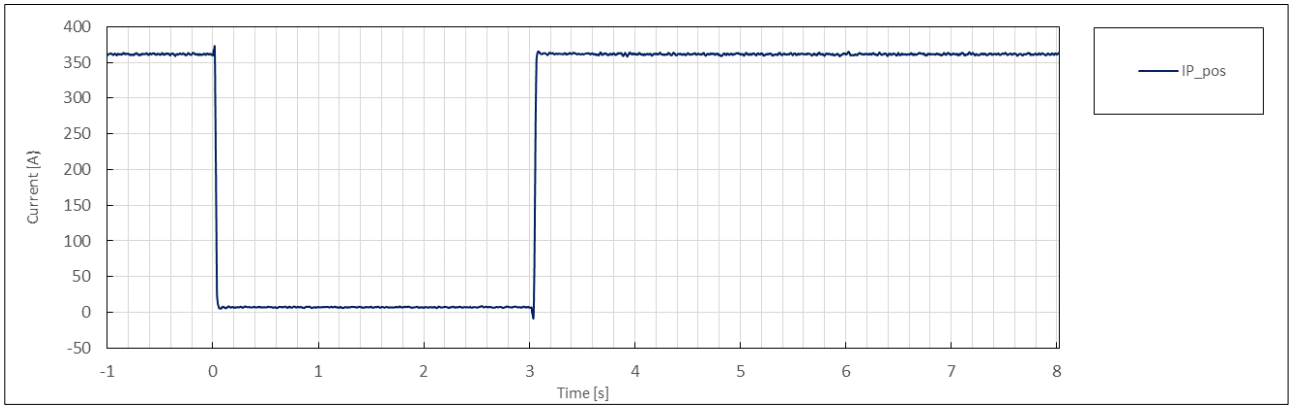


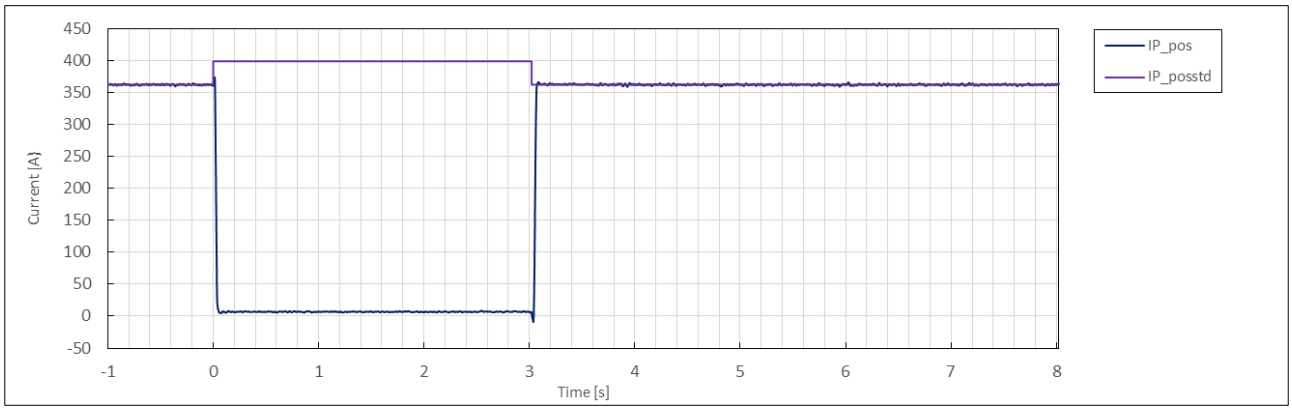


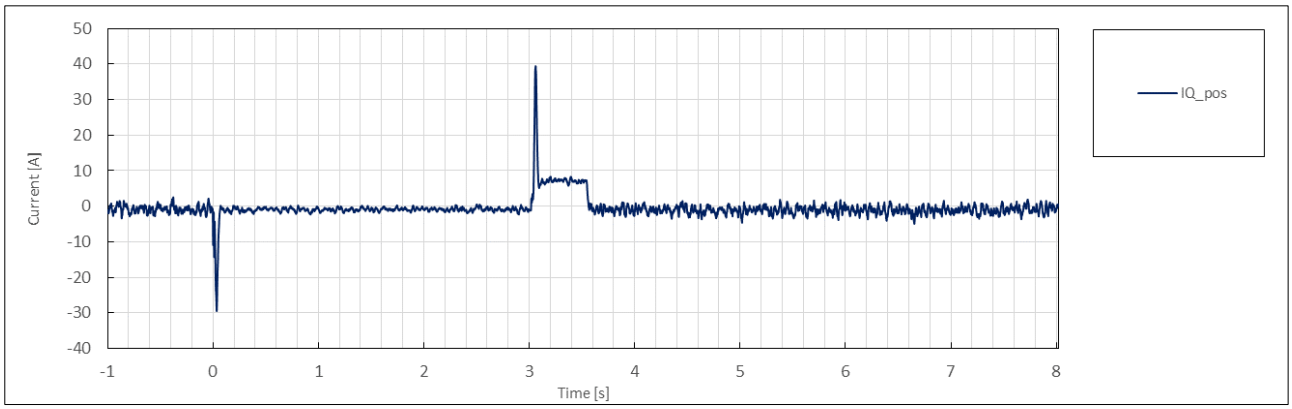


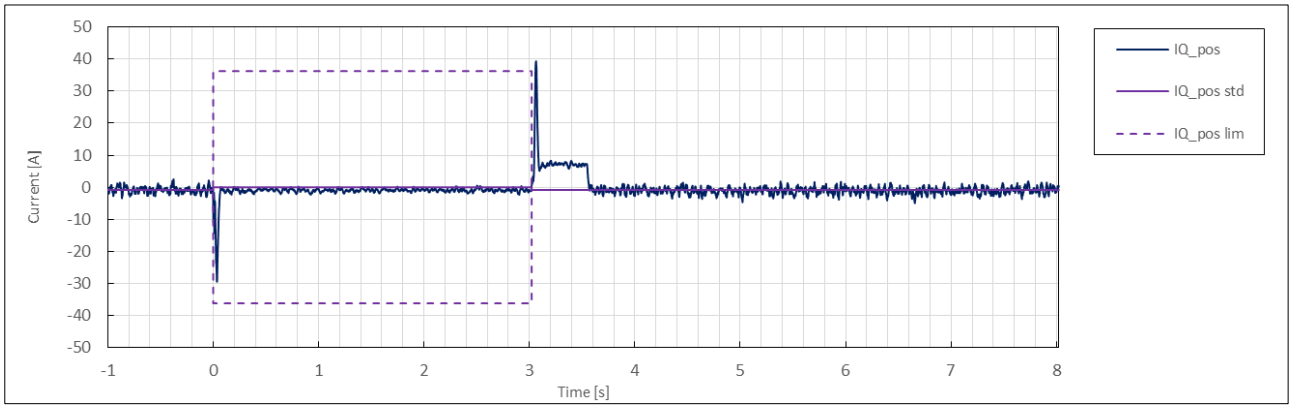


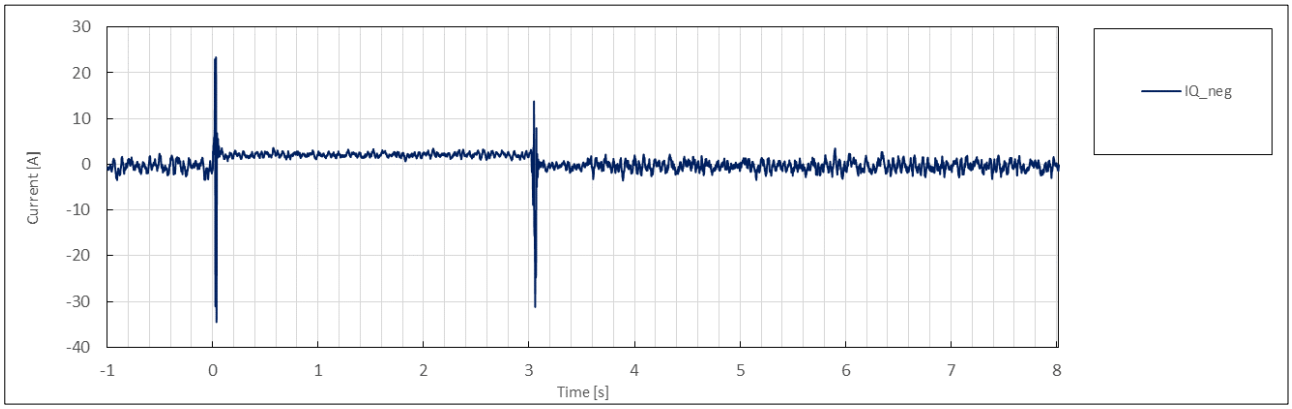

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

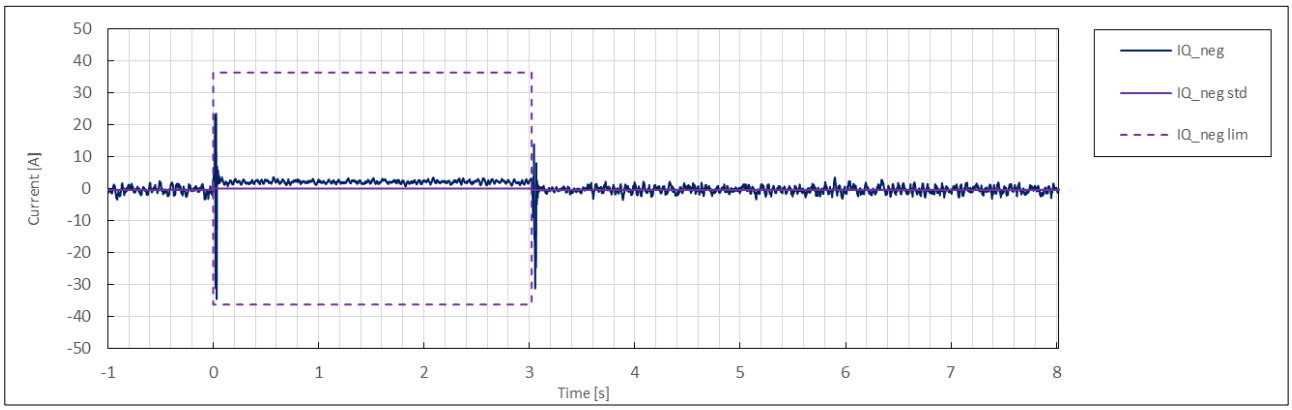

Current [A]
Time [s]
IP_pos

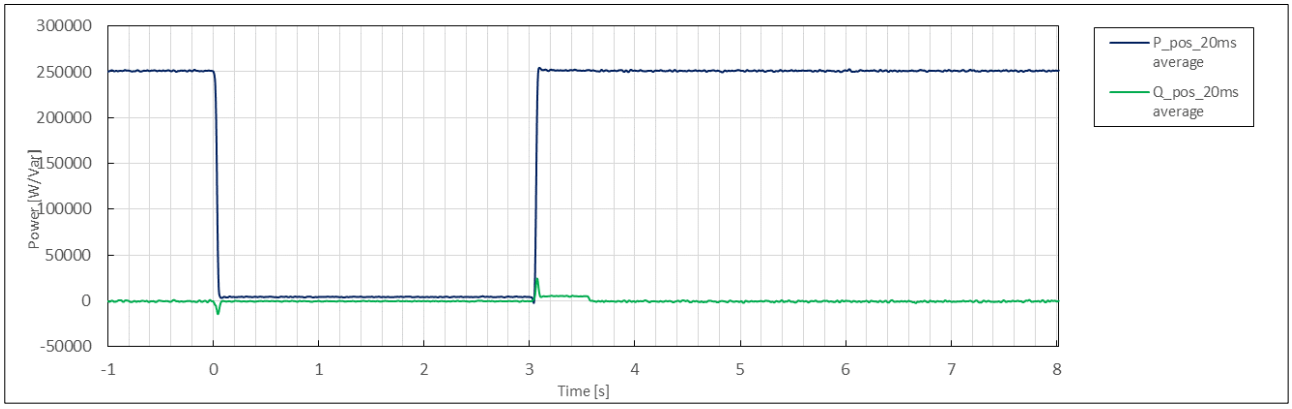

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

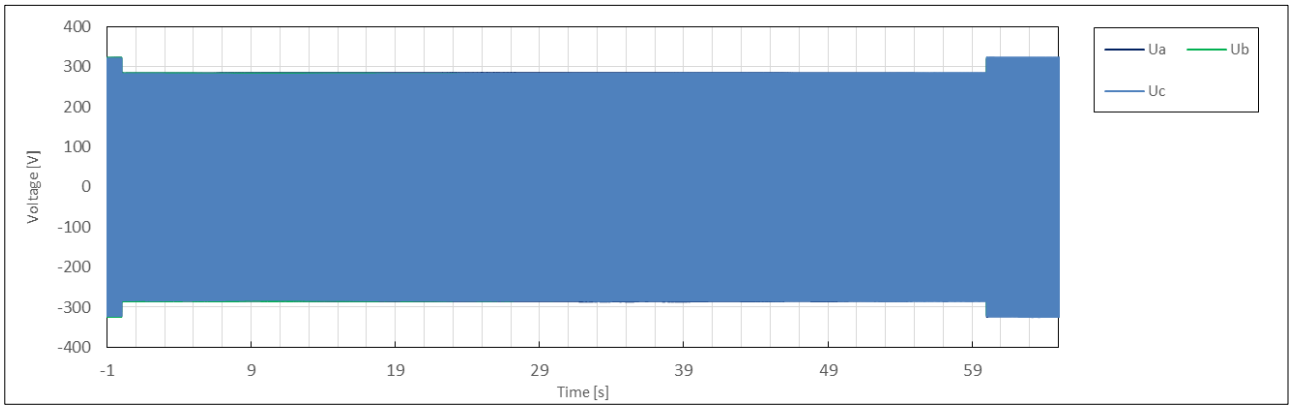

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

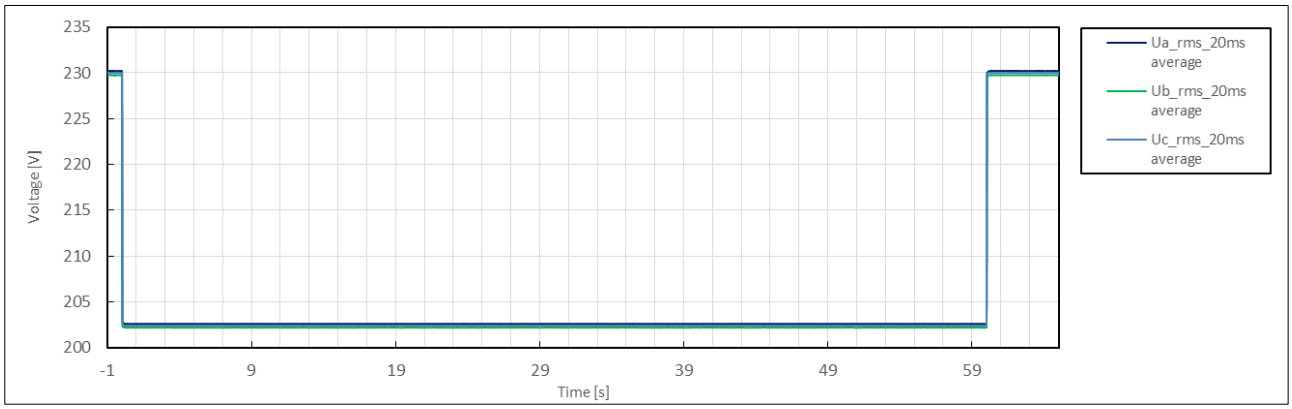

Current [A]
Time [s]
IQ_neg

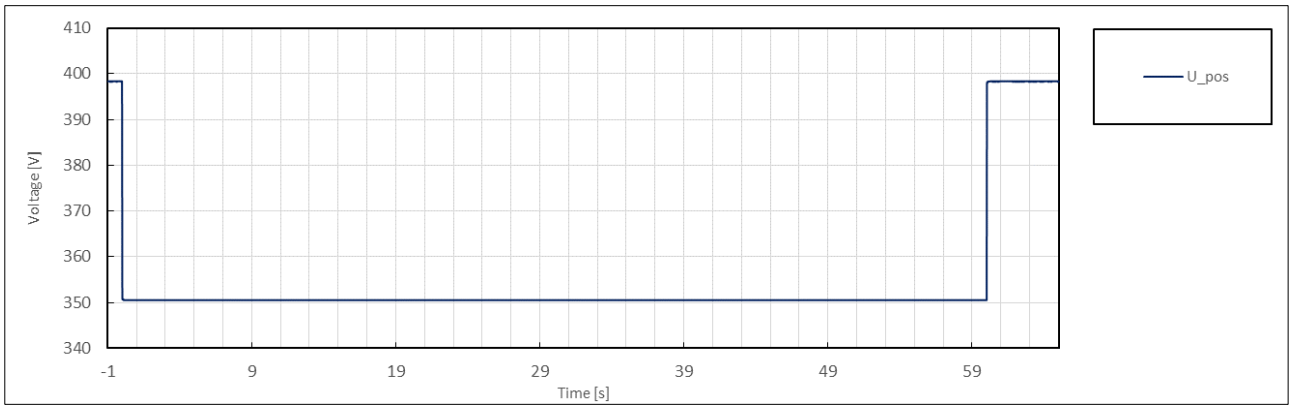

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


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

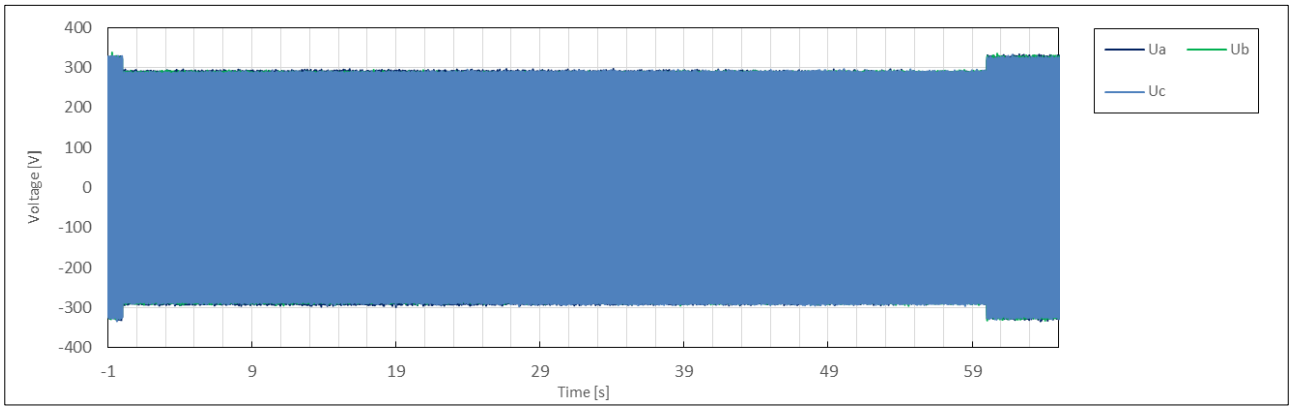
No. 5.1 Idle Test

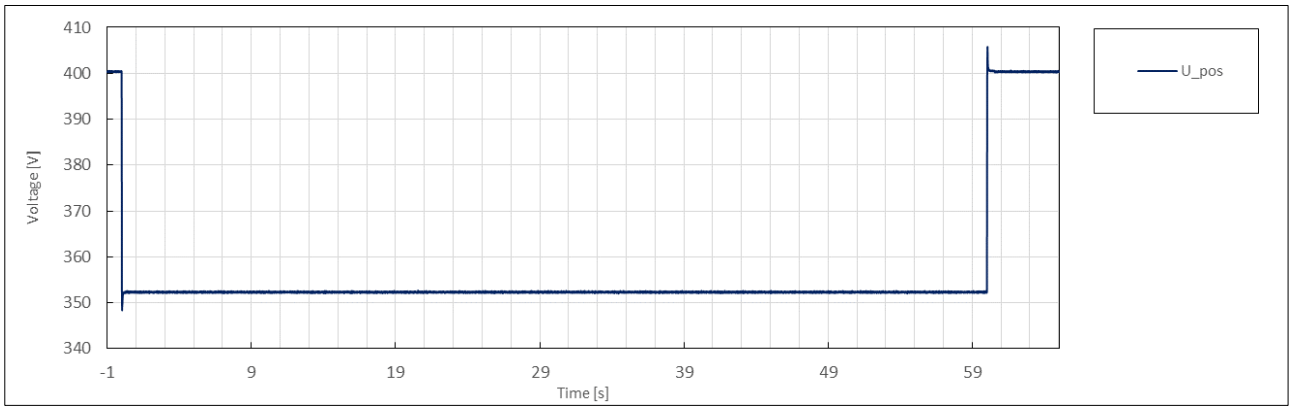


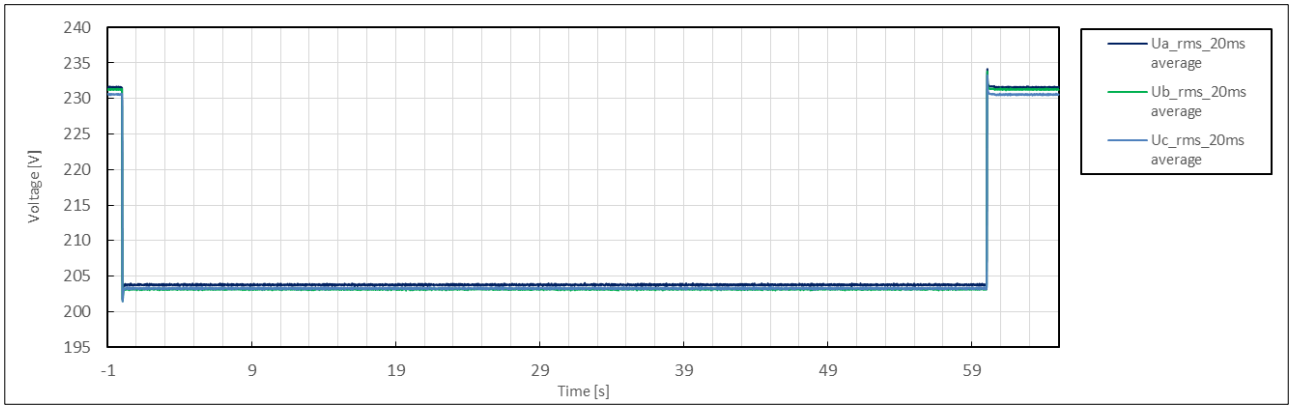


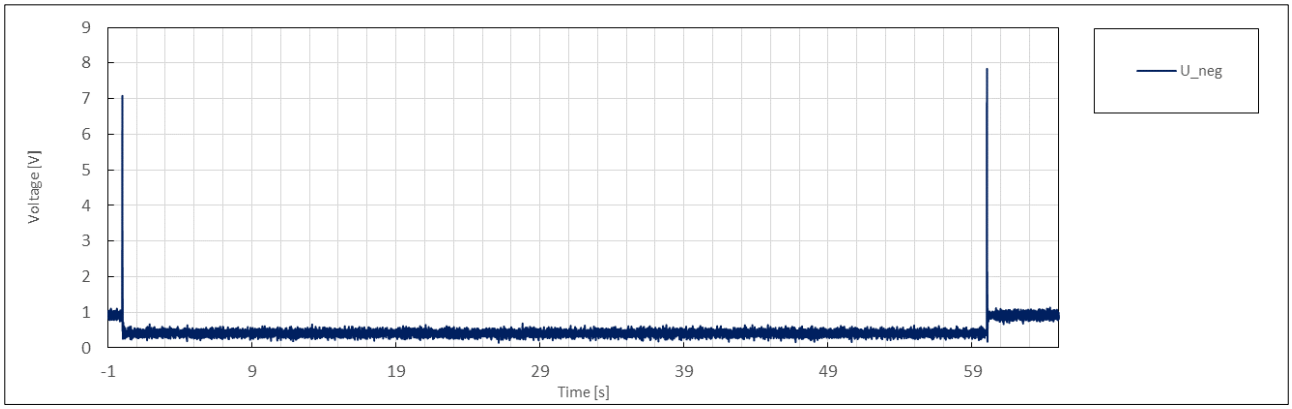


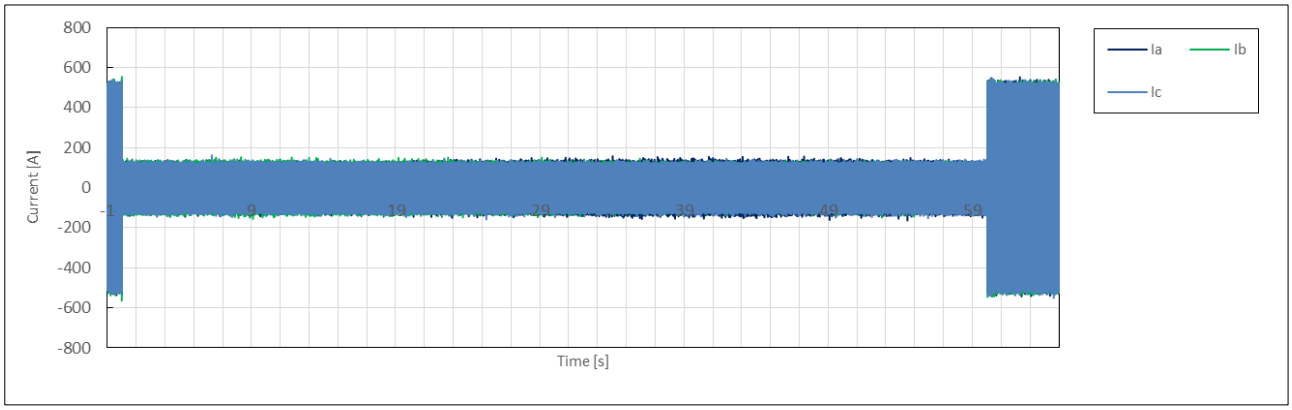
No. 5.1 Load Test

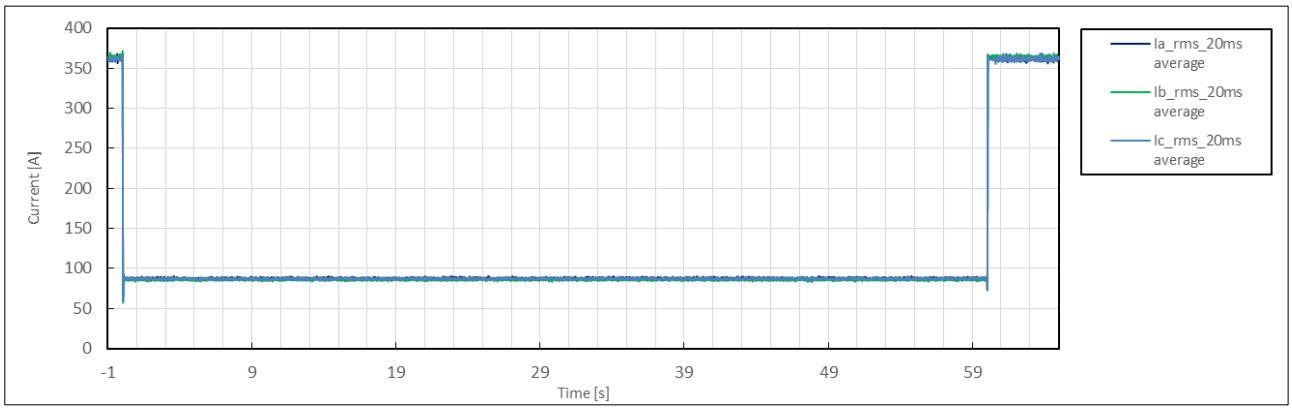


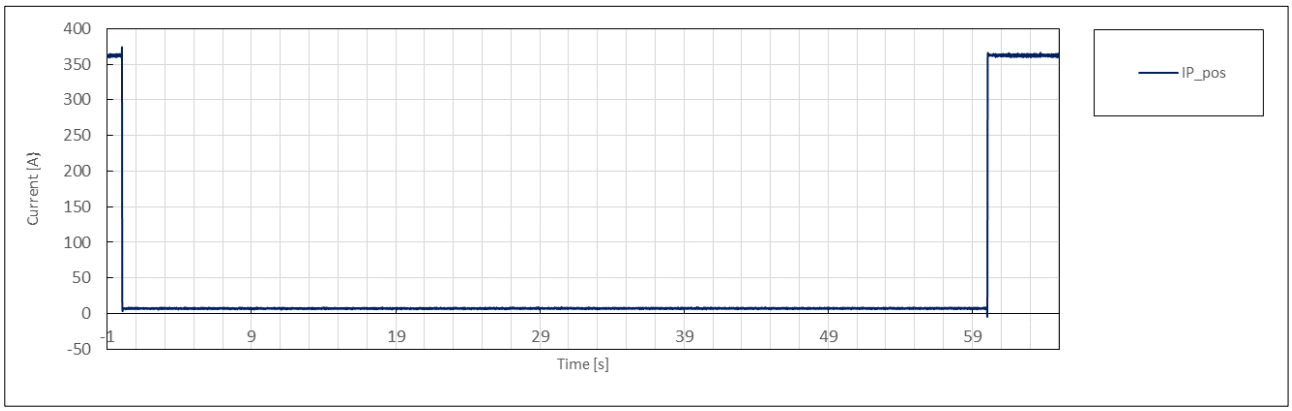


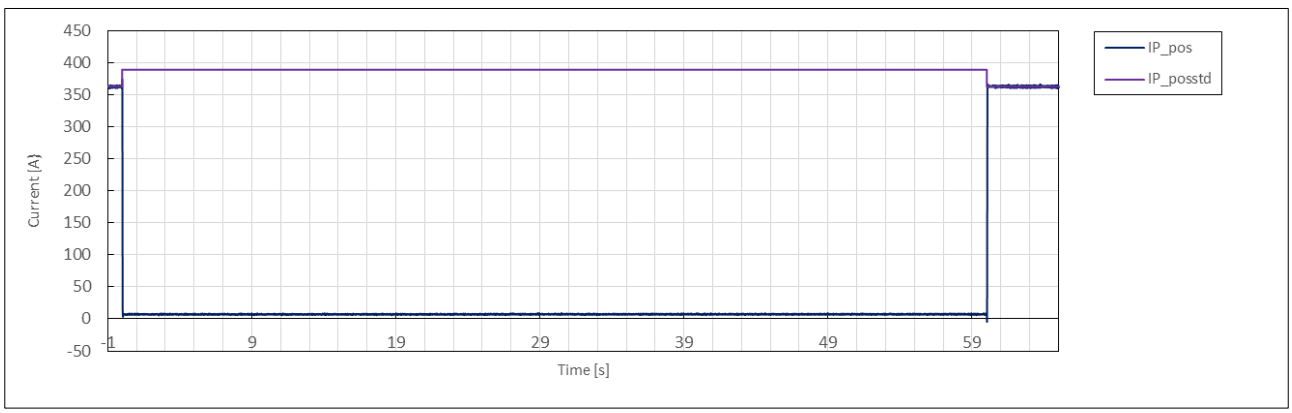


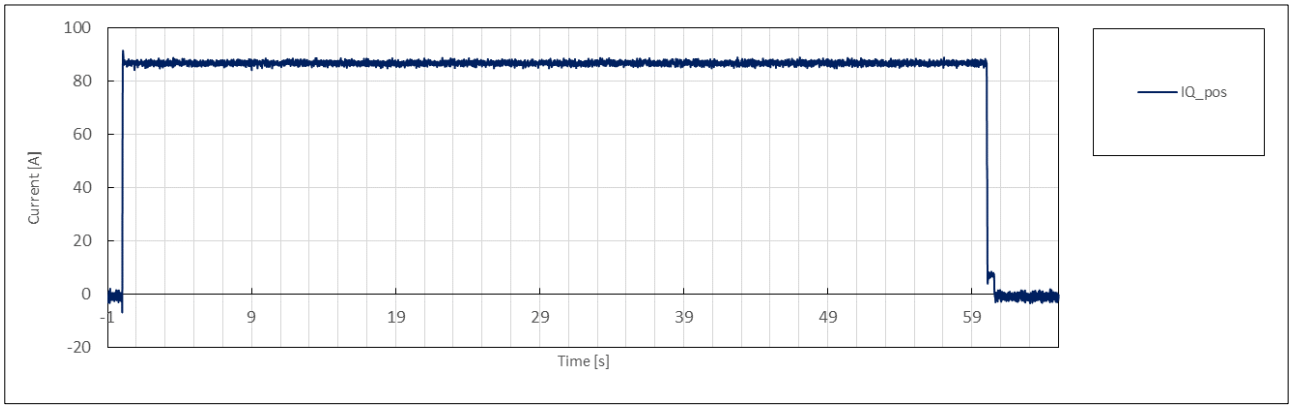


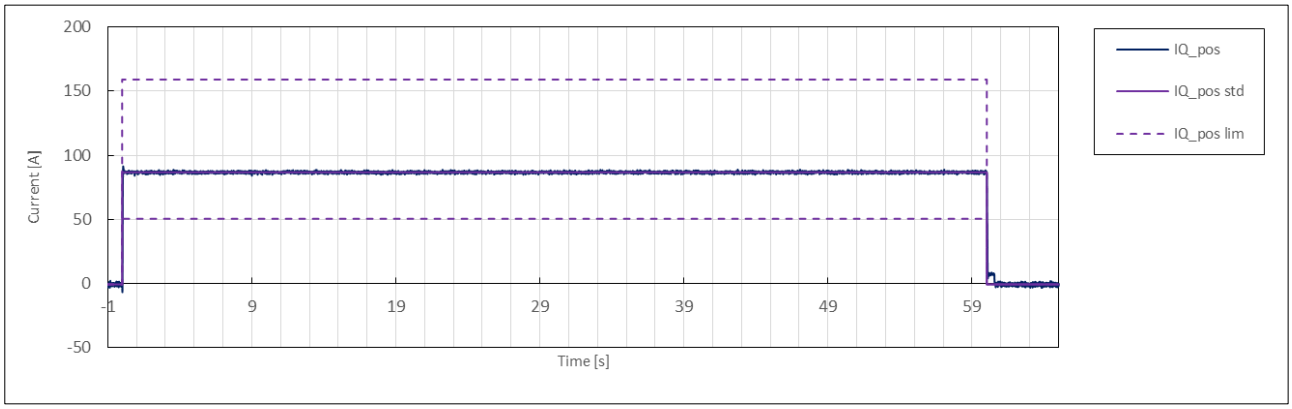

Current [A]
Time [s]
Ia
Ib
Ic

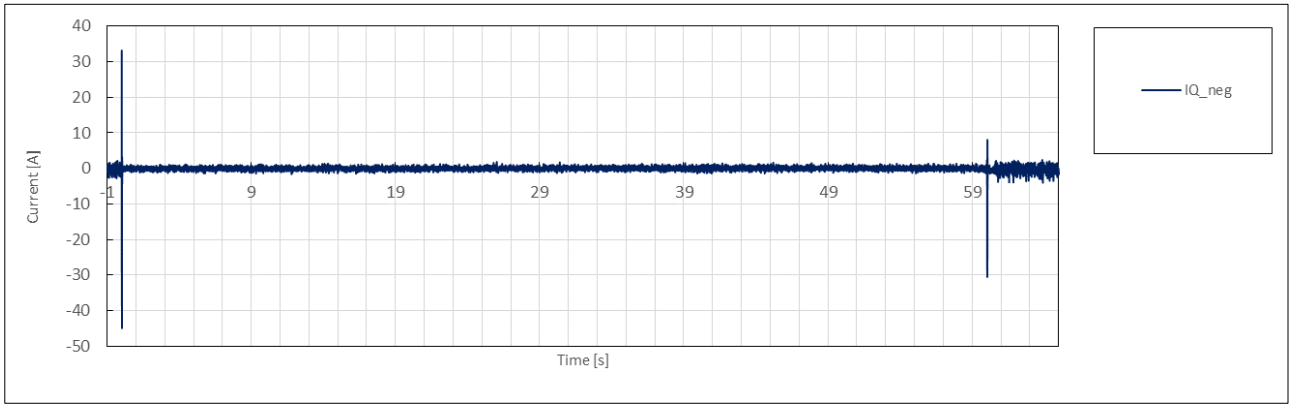

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

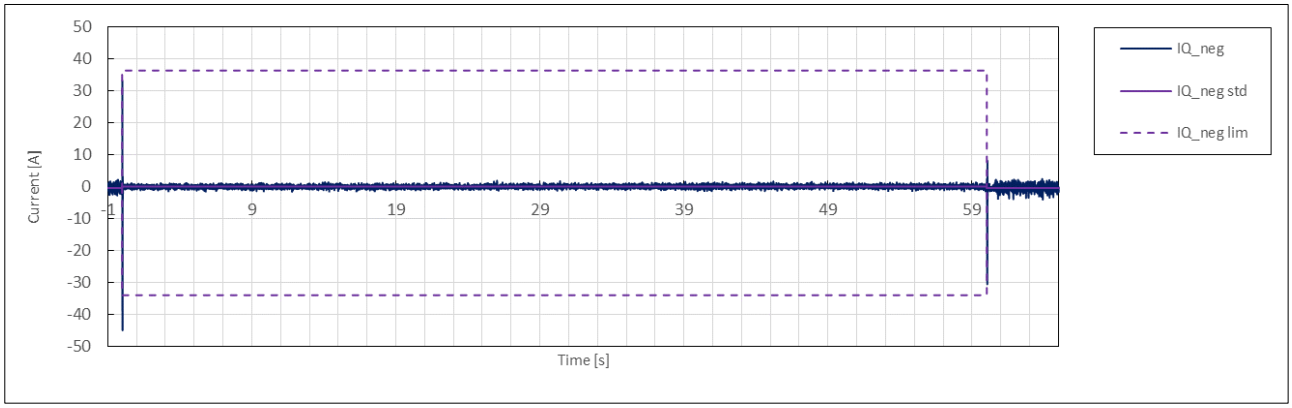

Current [A]
Time [s]
IP_pos

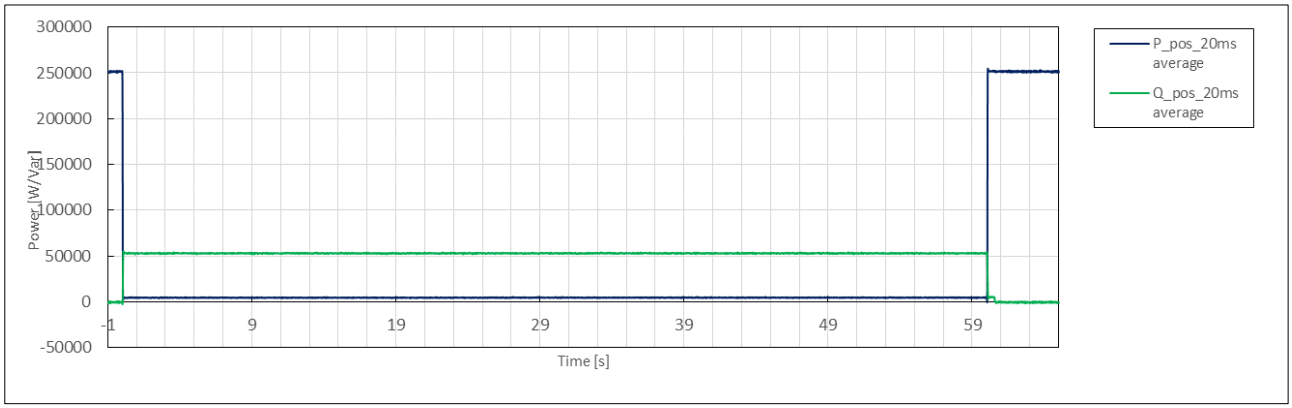

Current [A]
Time [s]
IP_pos
IP_posstd


100
80
60
40
20
0
-20
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos

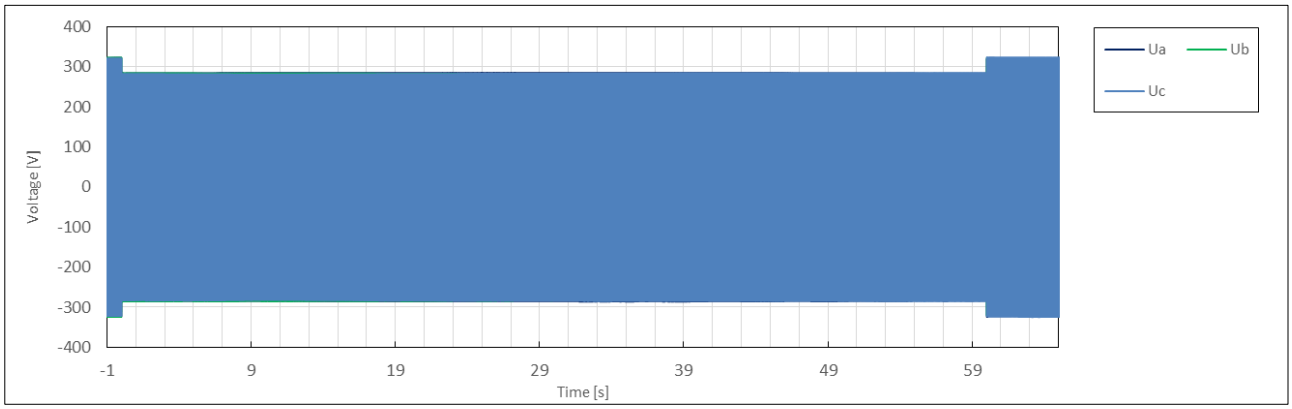

200
150
100
50
0
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

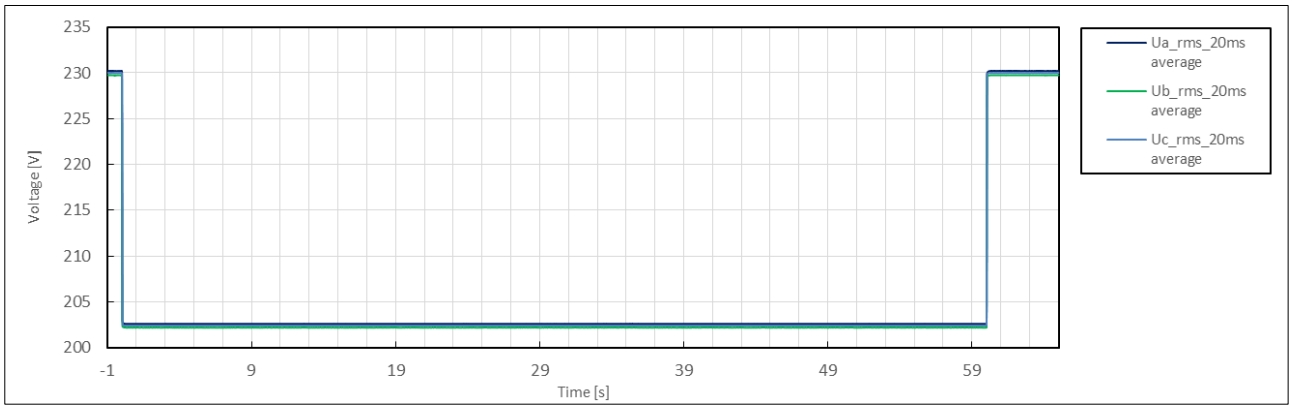

40
30
20
10
0
-10
-20
-30
-40
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg

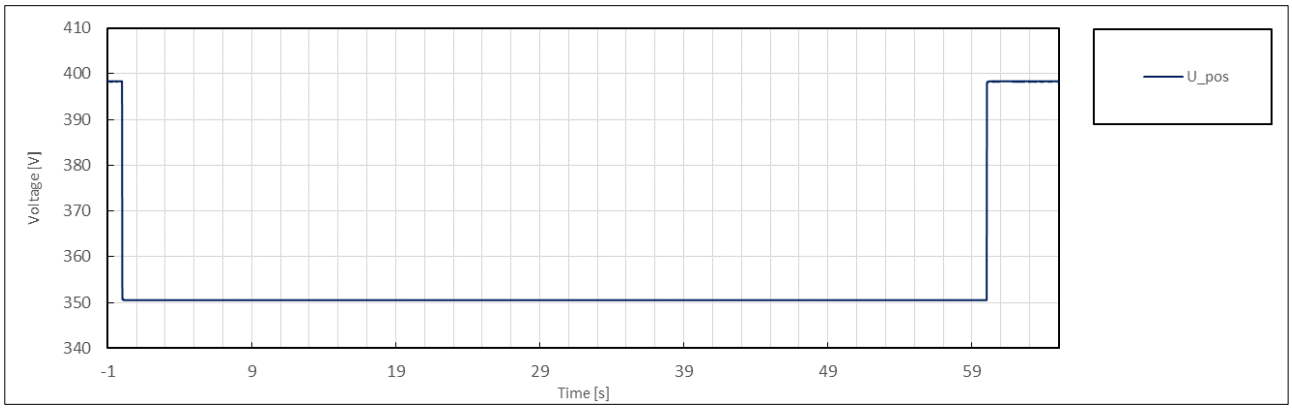

50
40
30
20
10
0
-10
-20
-30
-40
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
9
19
29
39
49
59
Time [s]
P_pos_20ms average
Q_pos_20ms average

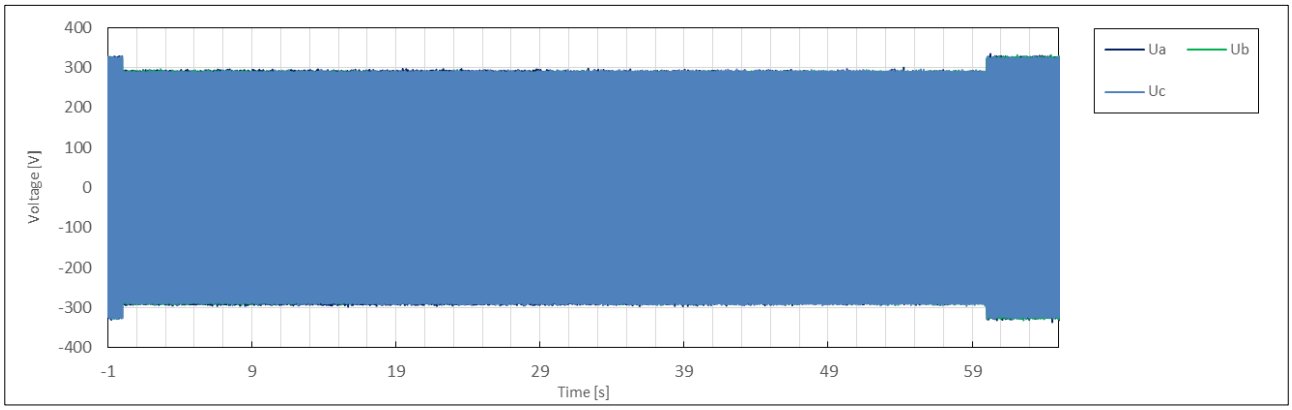
No. 5.2 Idle Test

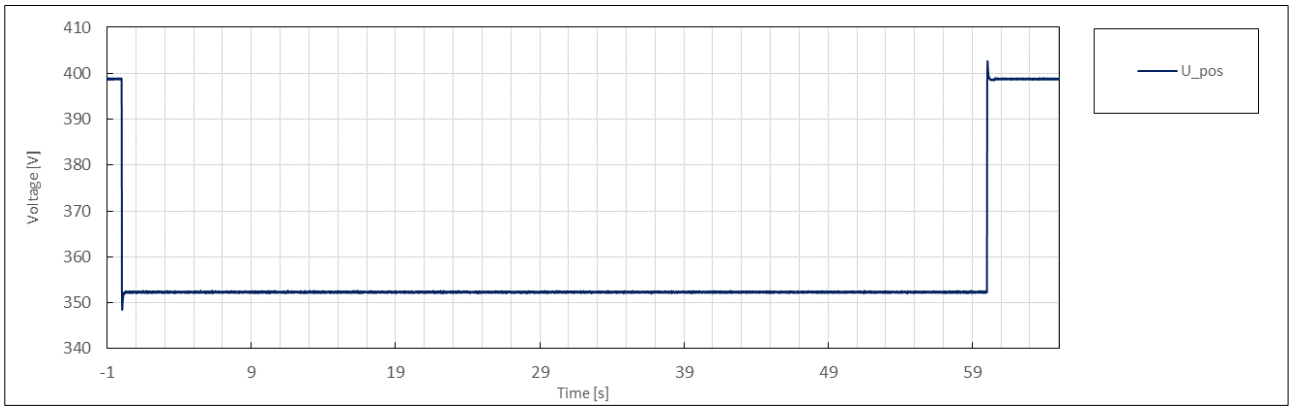


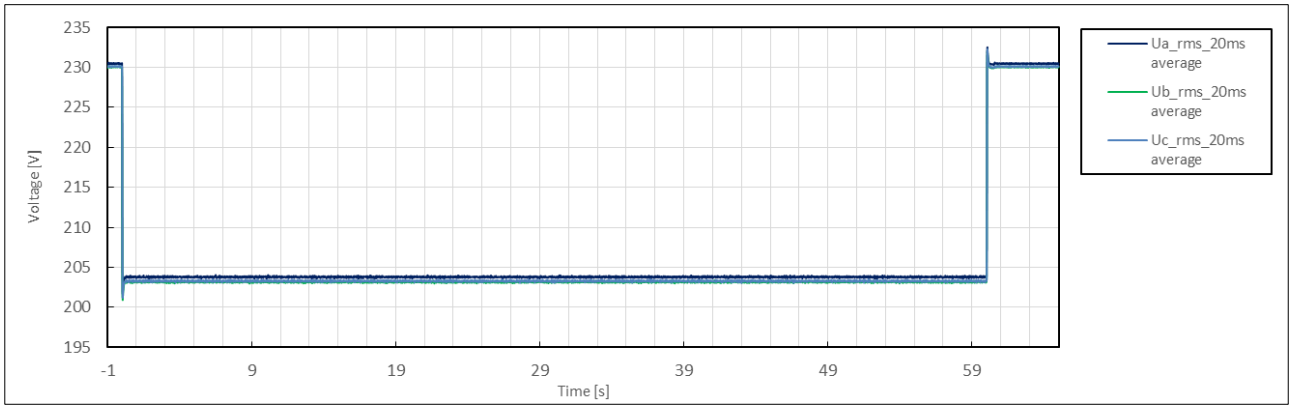


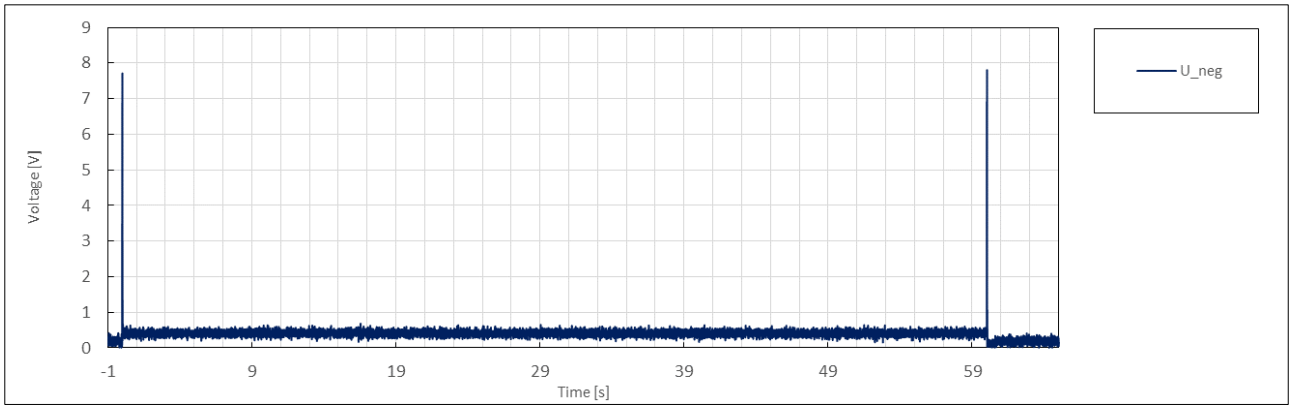


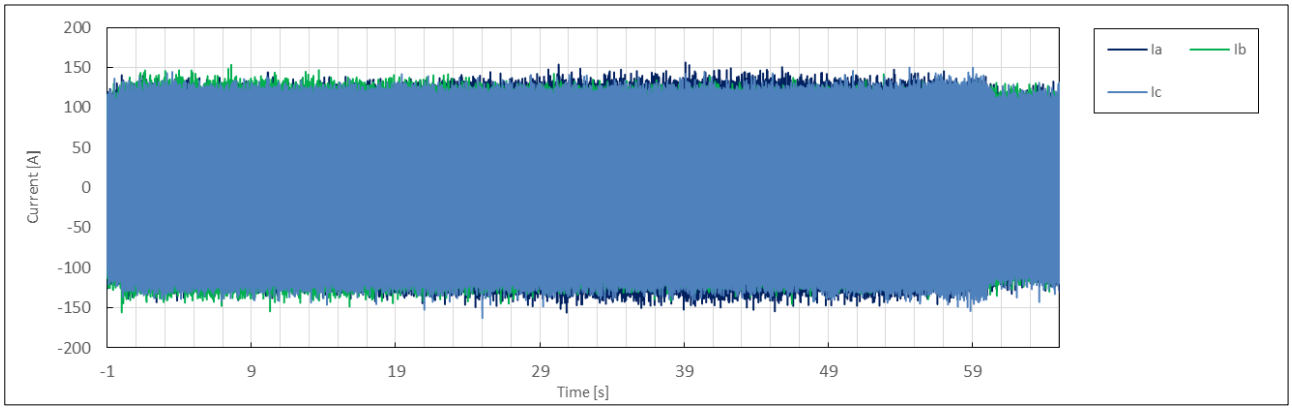
No. 5.2 Load Test

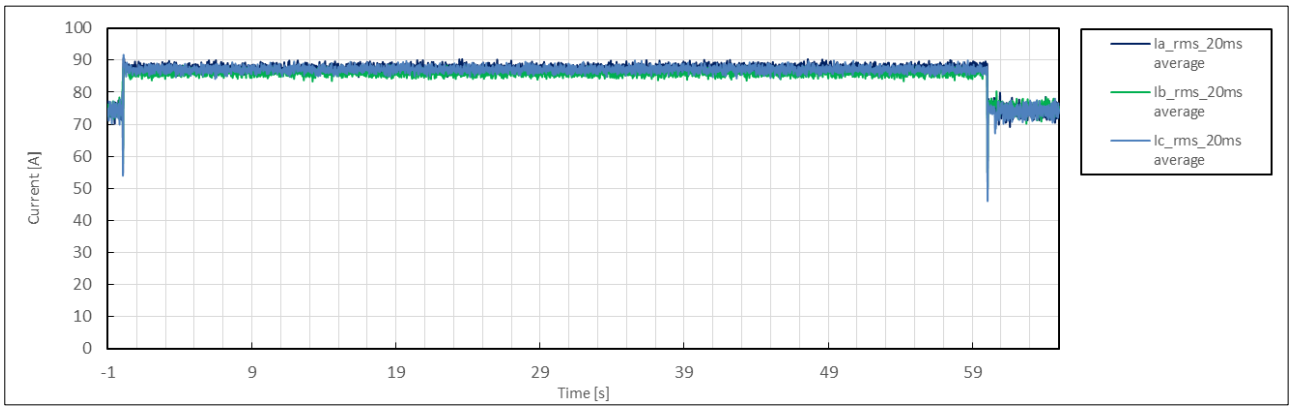


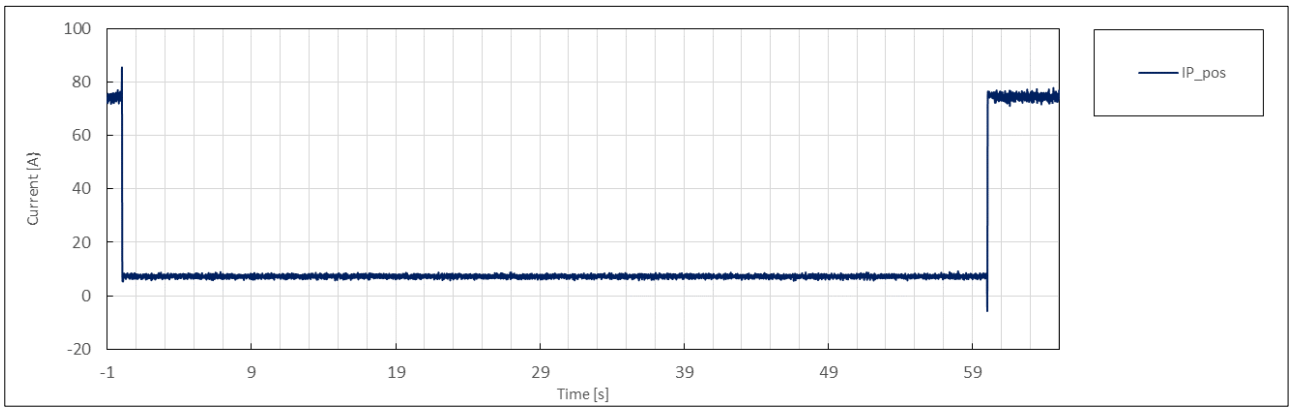


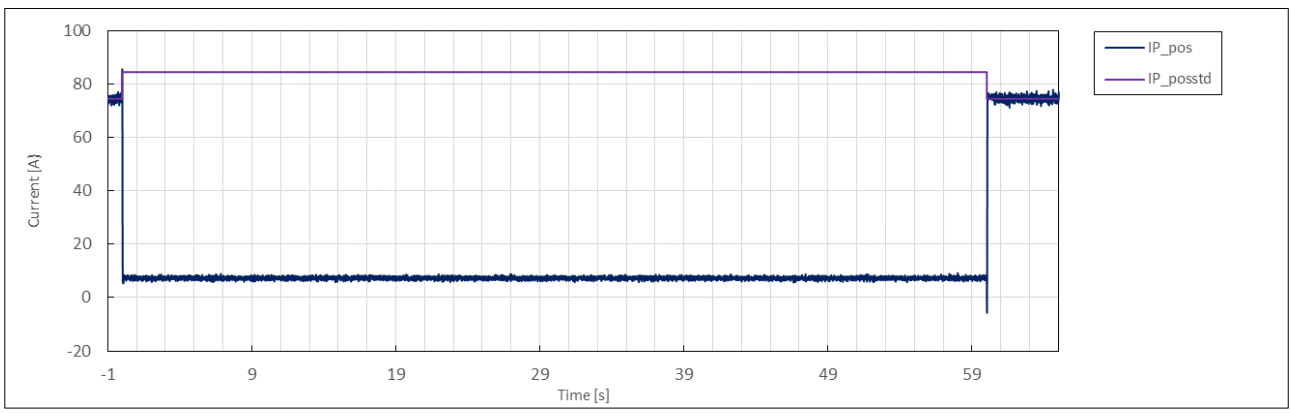


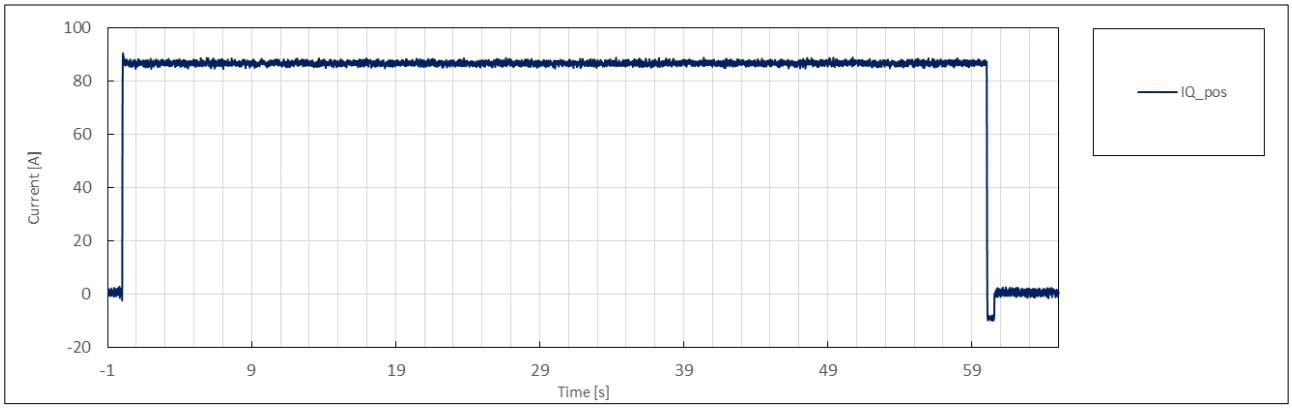


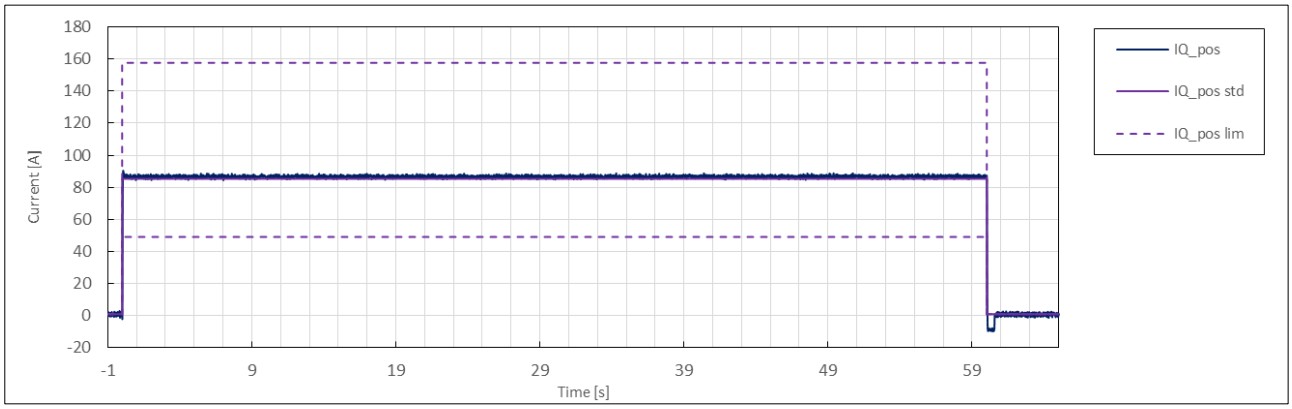

Current [A]
Time [s]
Ia
Ib
Ic

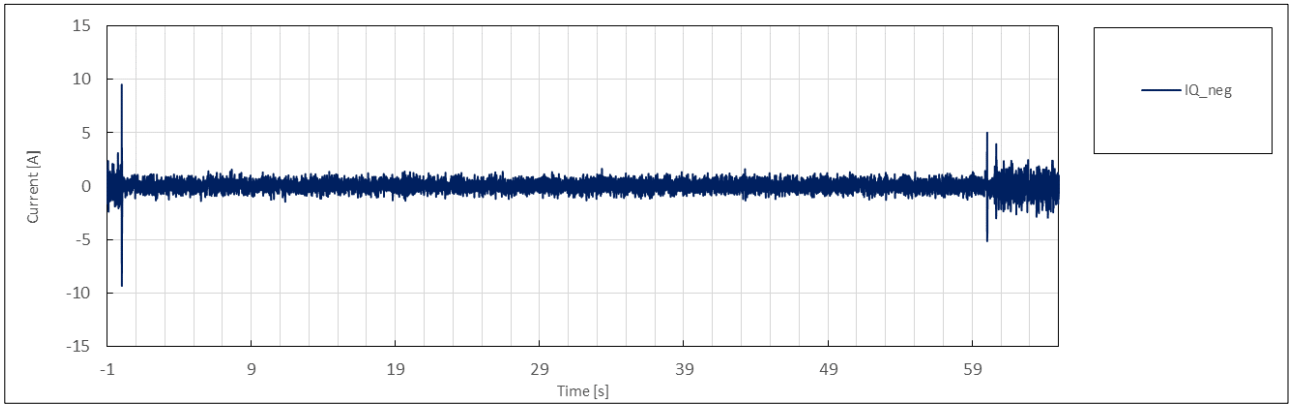

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

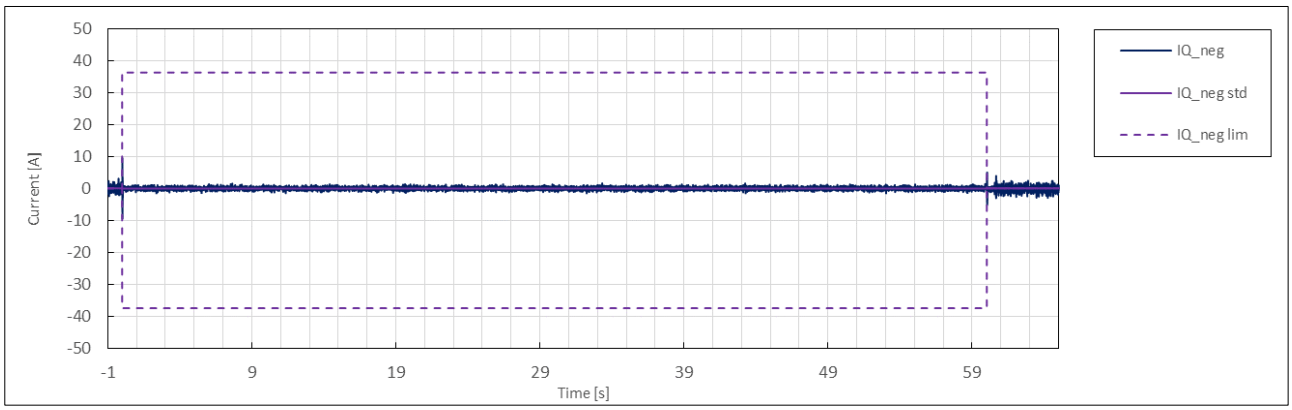

Current [A]
Time [s]
IP_pos

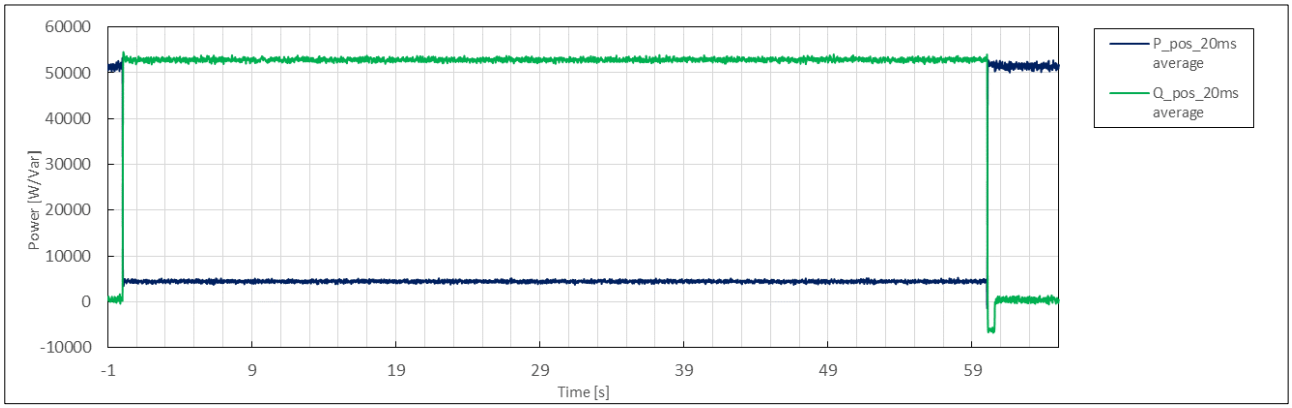

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

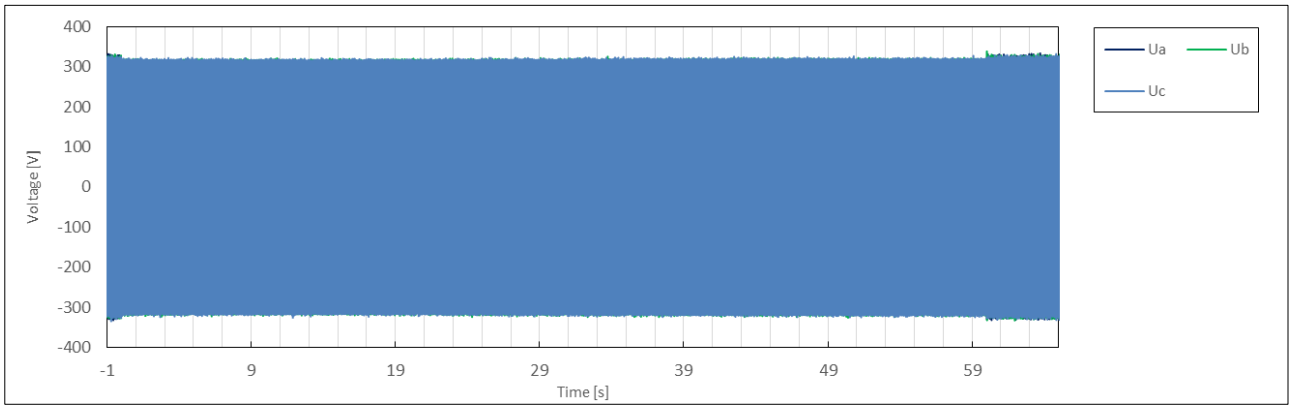

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

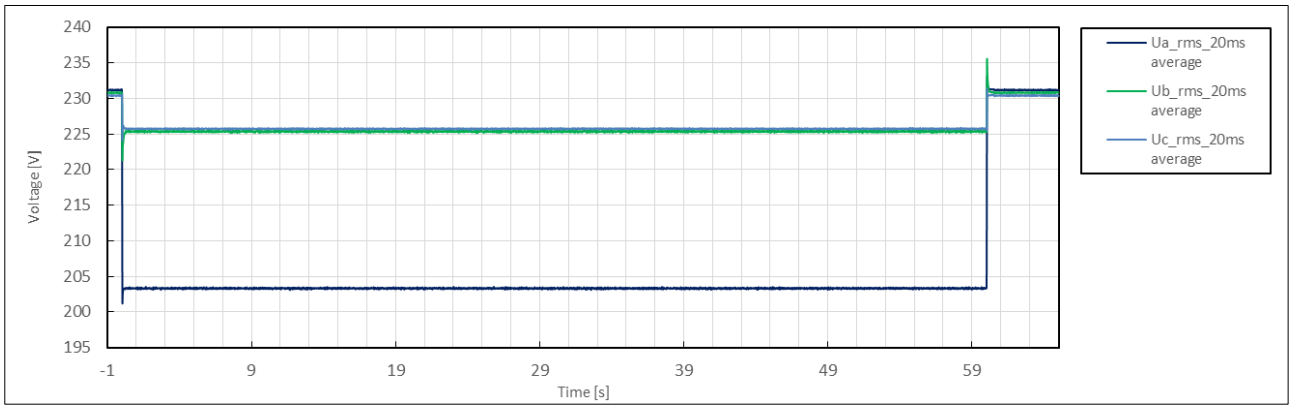

Current [A]
Time [s]
IQ_neg

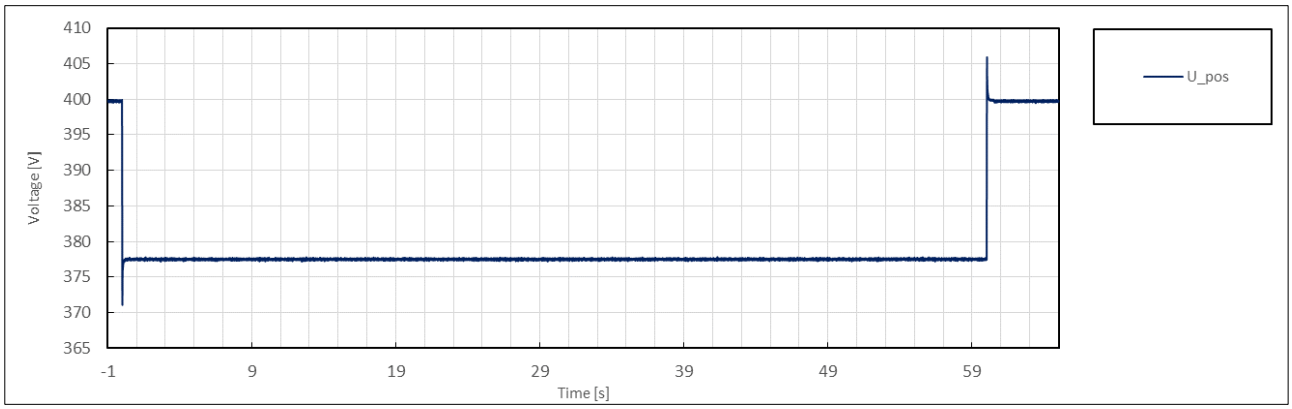

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


60000
50000
40000
30000
20000
10000
0
-10000
Power [W/Var]
-1
9
19
29
39
49
59
Time [s]
P_pos_20ms average
Q_pos_20ms average

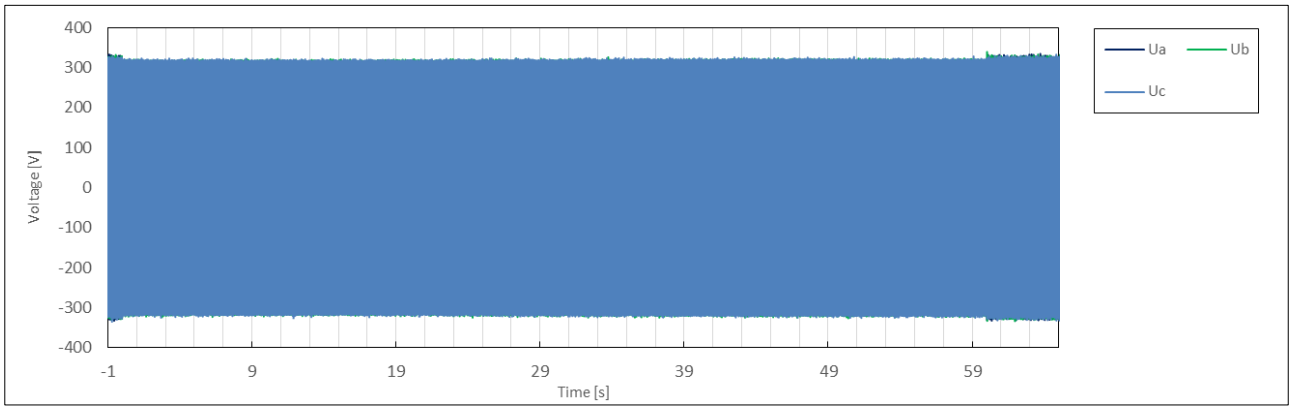
No. 5.3 Idle Test

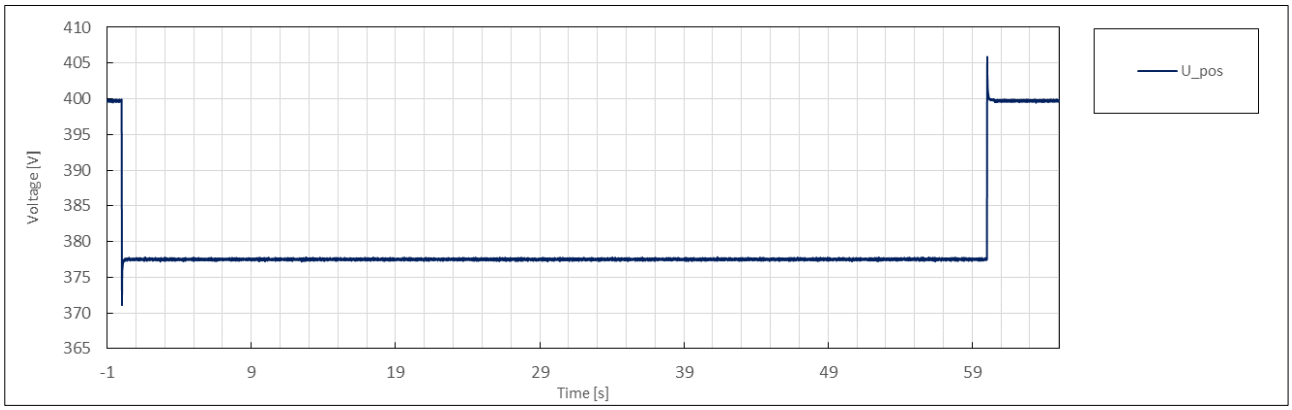


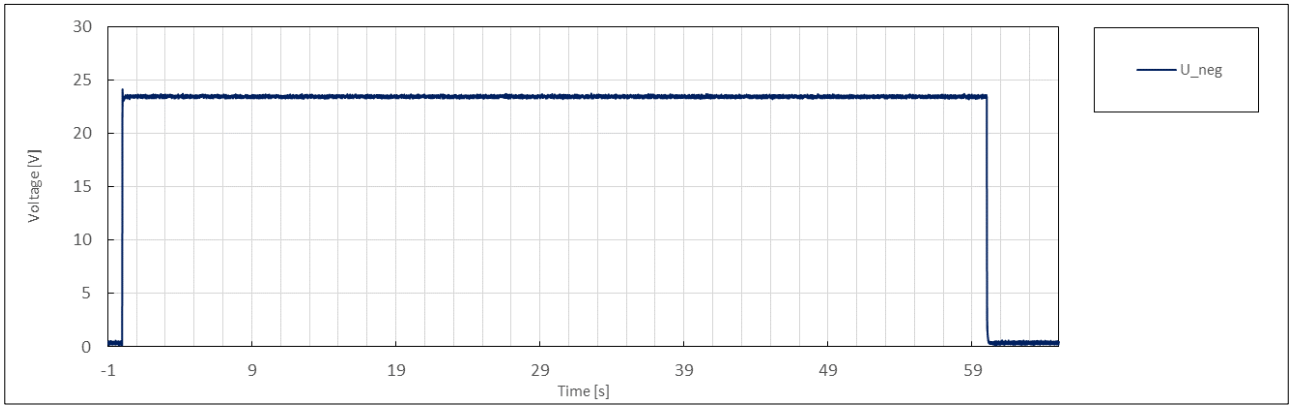


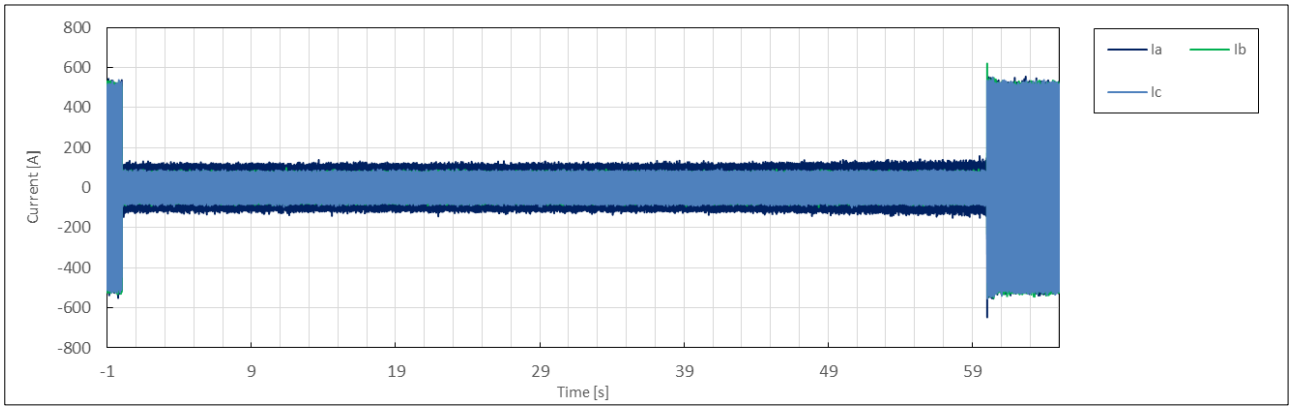


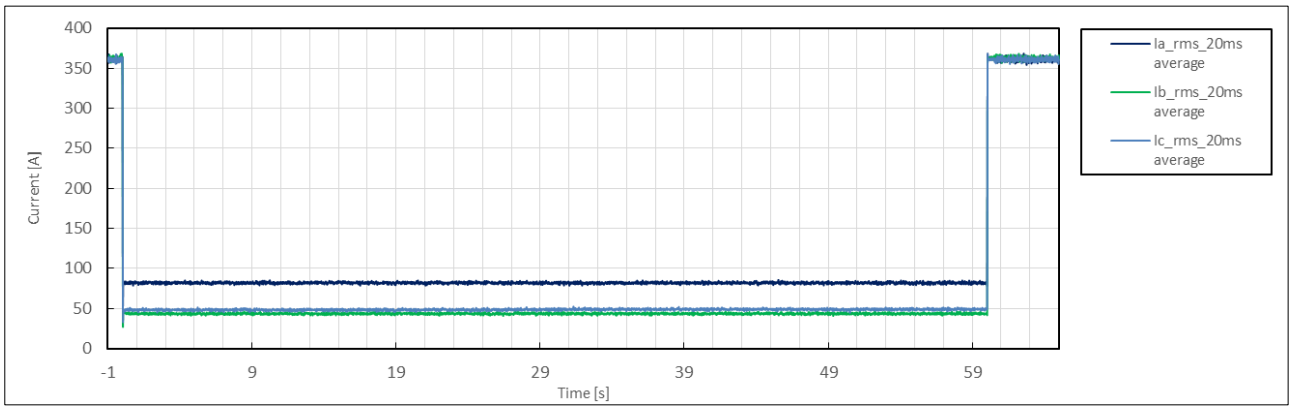
No. 5.3 Load Test

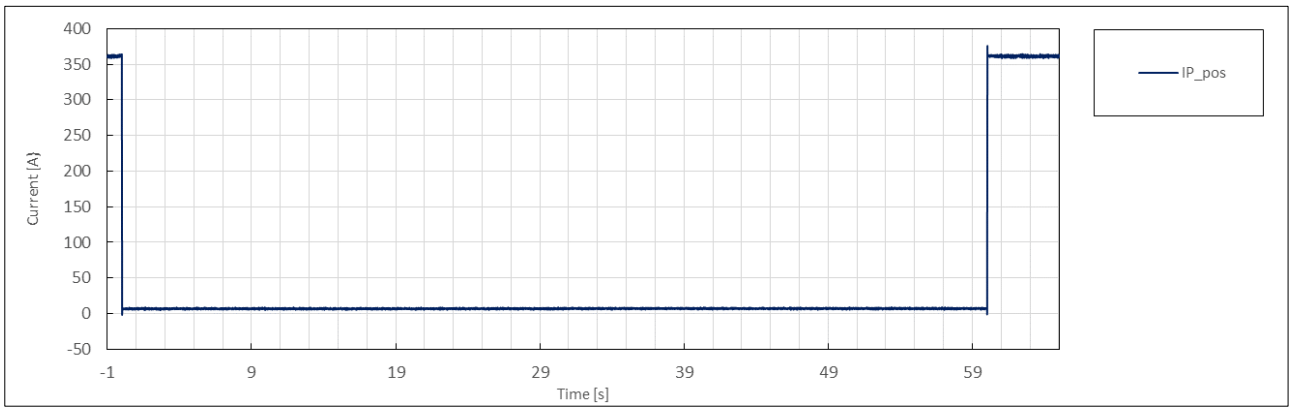


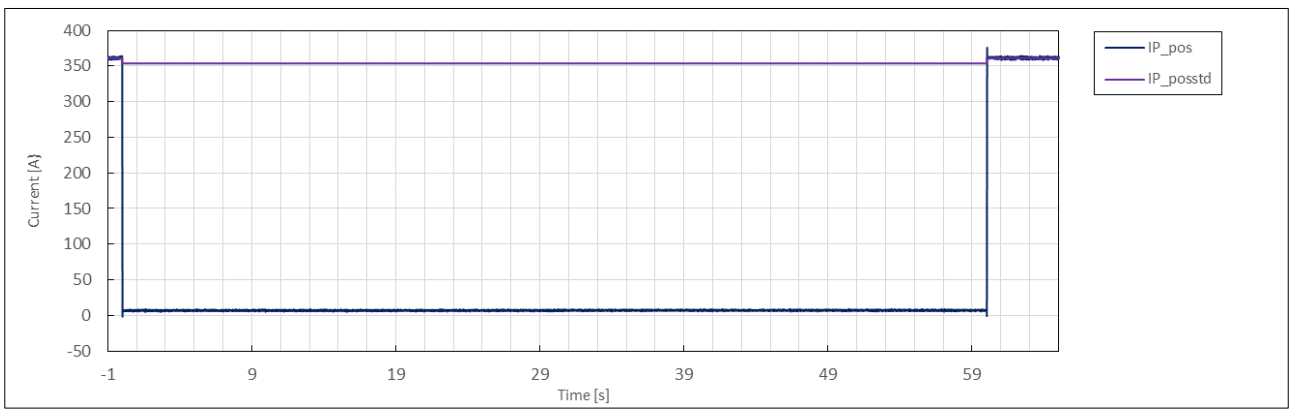


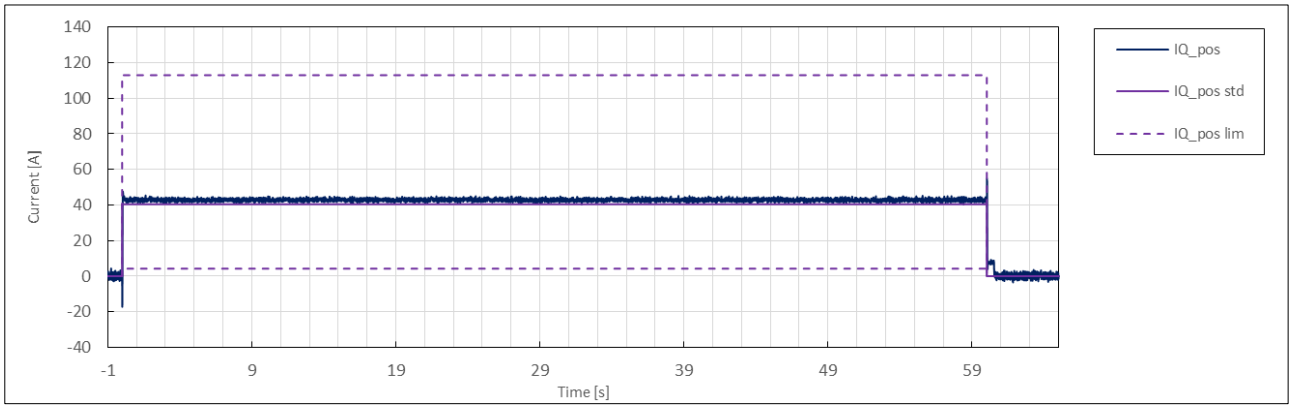


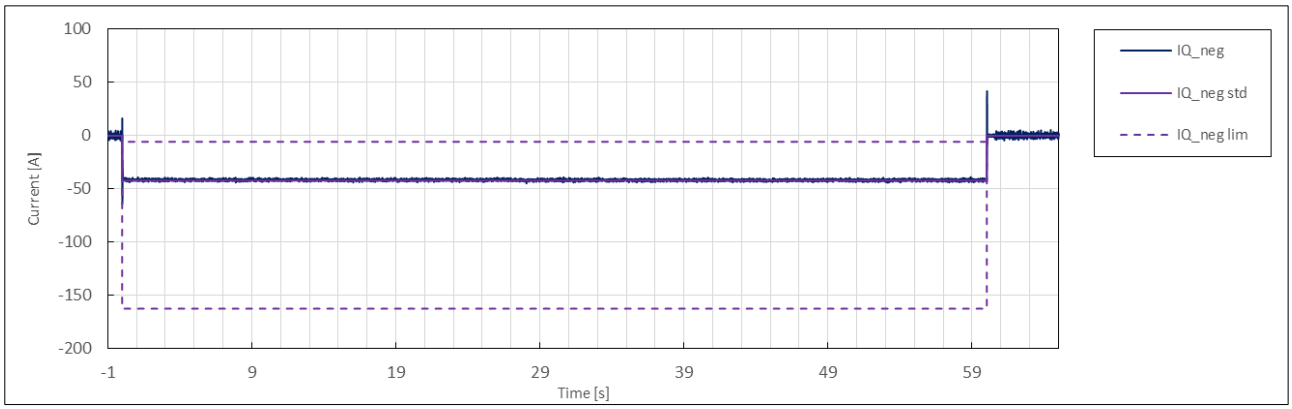

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
9
19
29
39
49
59
Time [s]
Ia
Ib
Ic

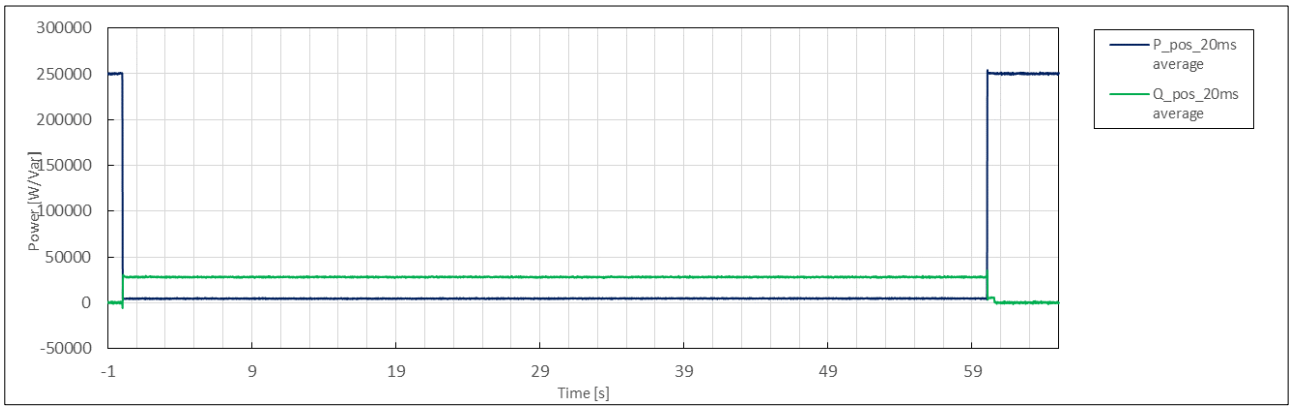

400
350
300
250
200
150
100
50
0
Current [A]
-1
9
19
29
39
49
59
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average


400
350
300
250
200
150
100
50
0
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IP_pos

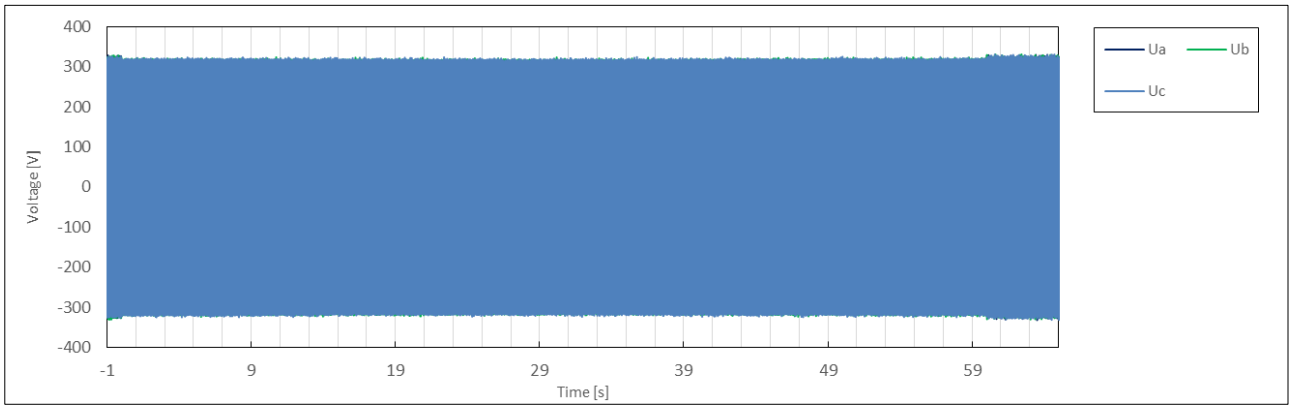

400
350
300
250
200
150
100
50
0
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IP_pos
IP_posstd

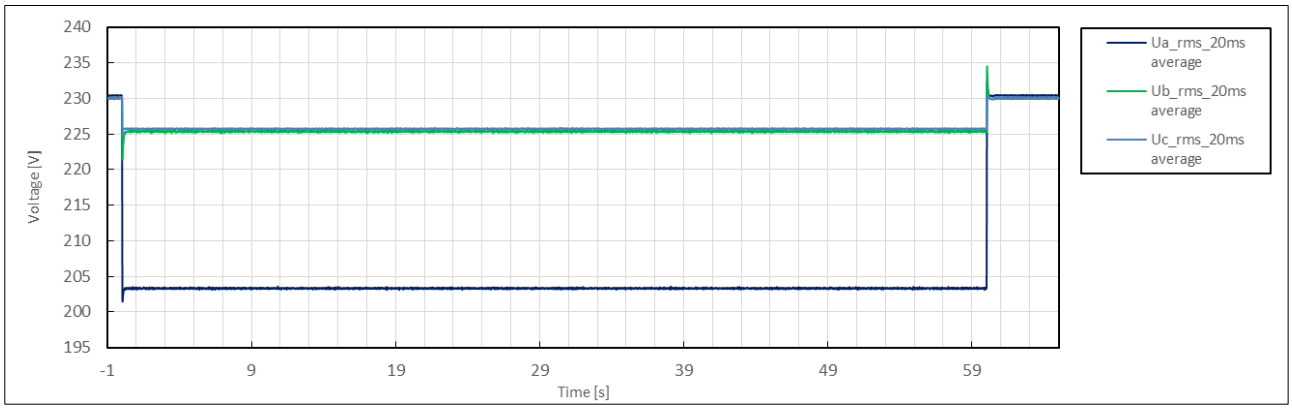

140
120
100
80
60
40
20
0
-20
-40
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

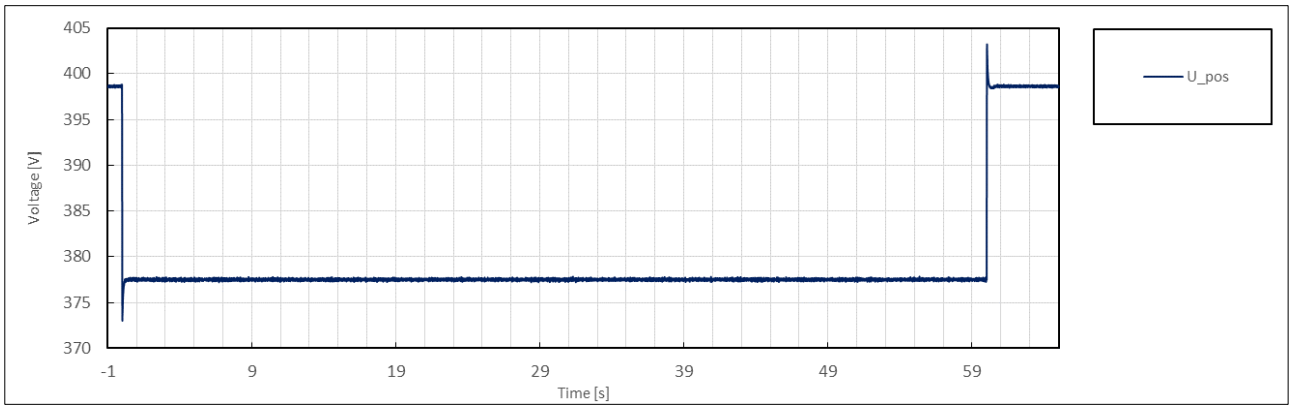

100
50
0
-50
-100
-150
-200
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
9
19
29
39
49
59
Time [s]
P_pos_20ms average
Q_pos_20ms average

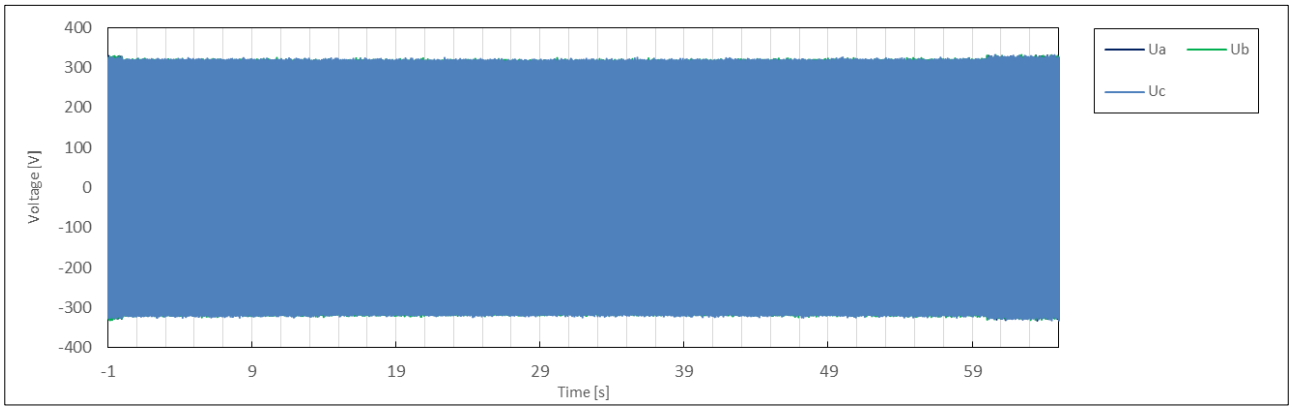
No. 5.4 Idle Test

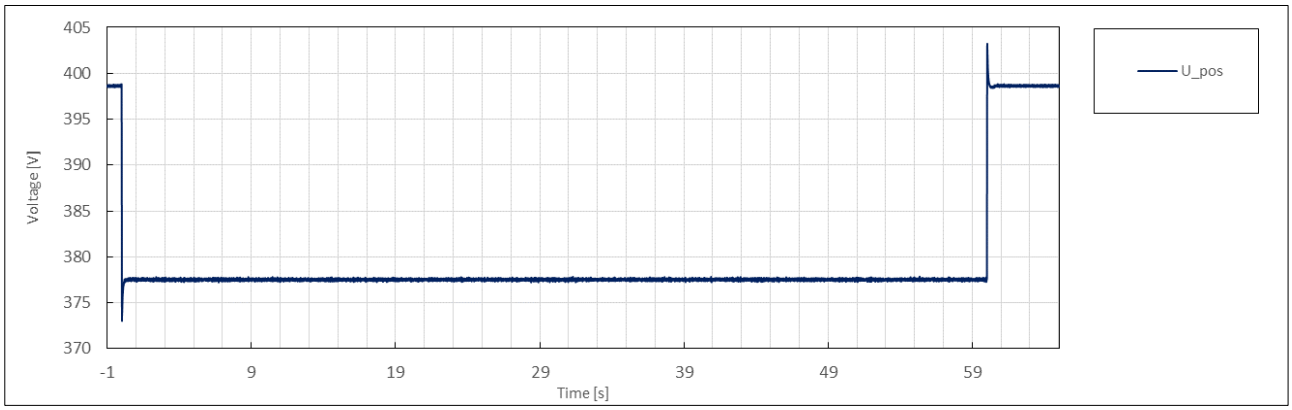


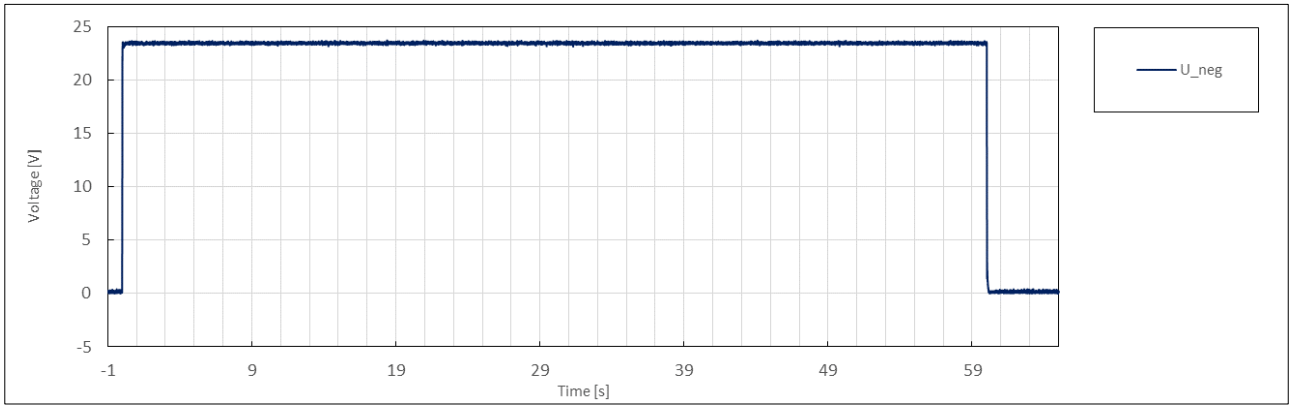


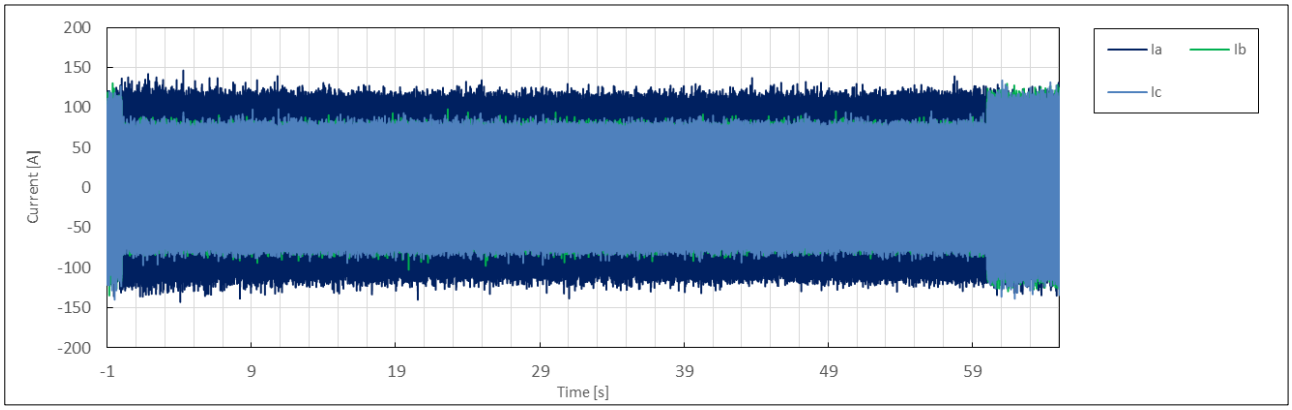


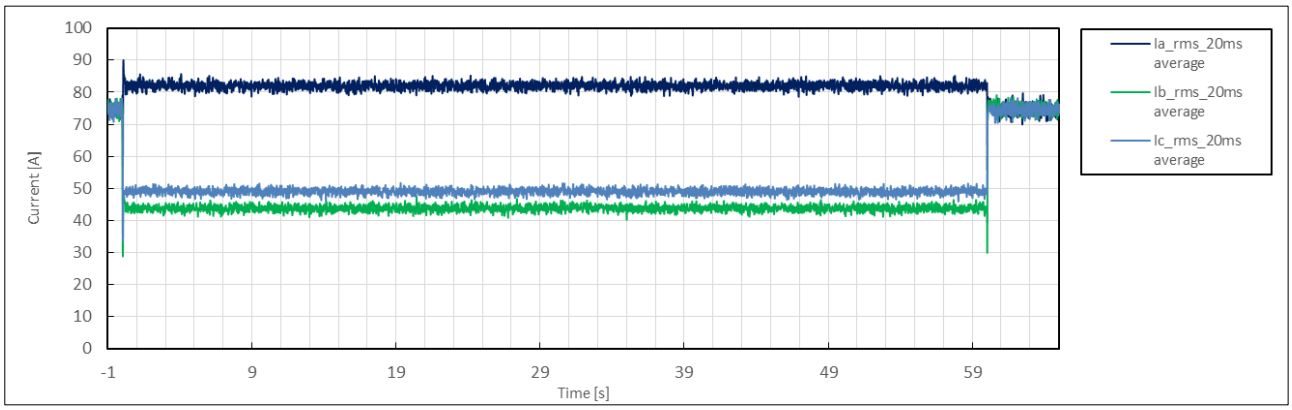
No. 5.4 Load Test

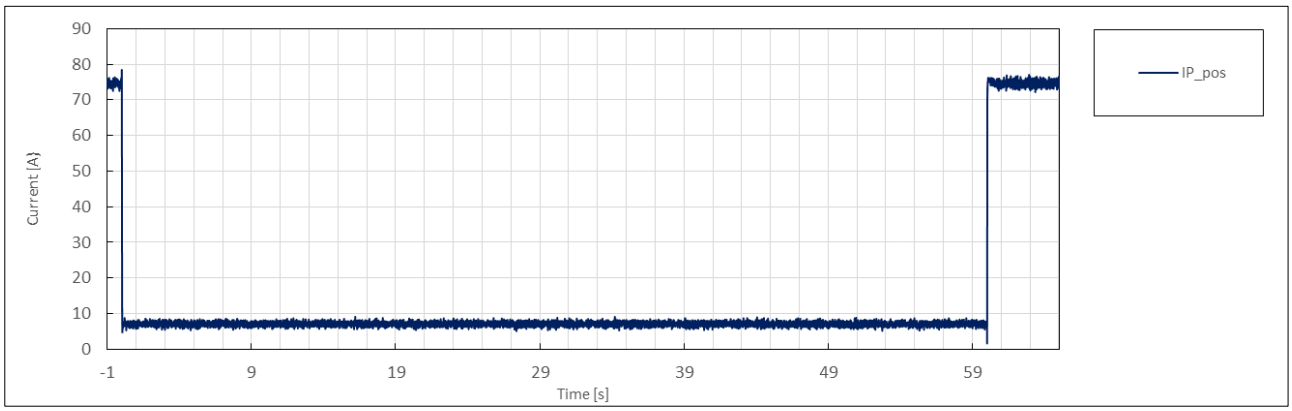


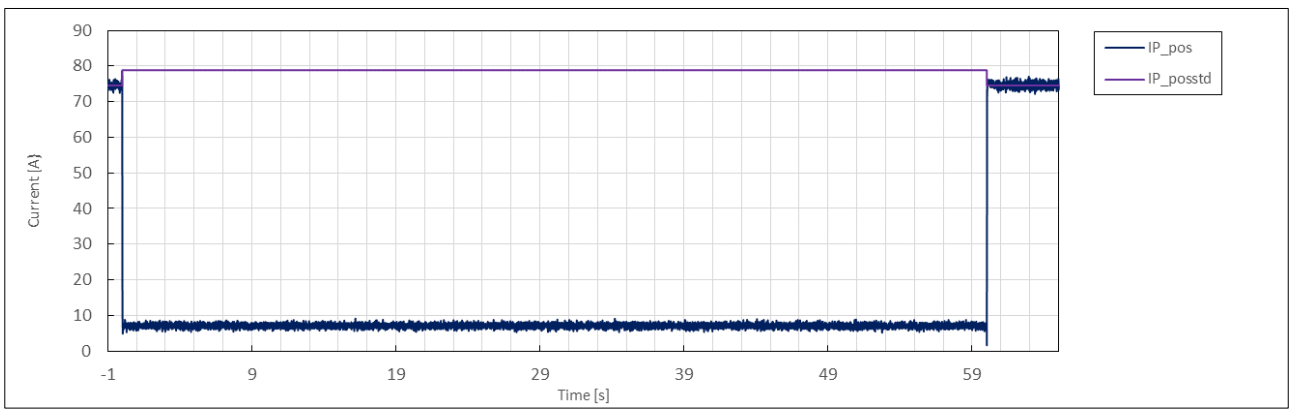


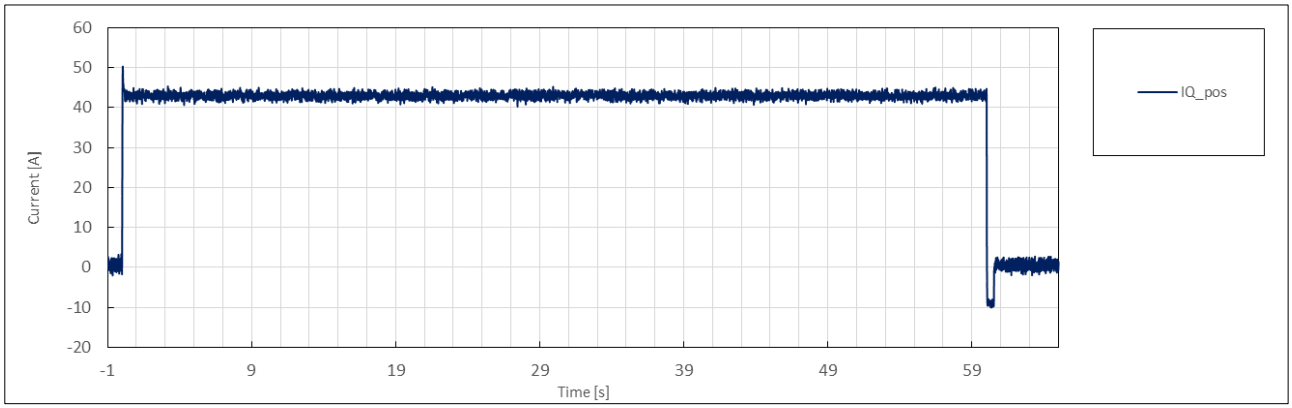


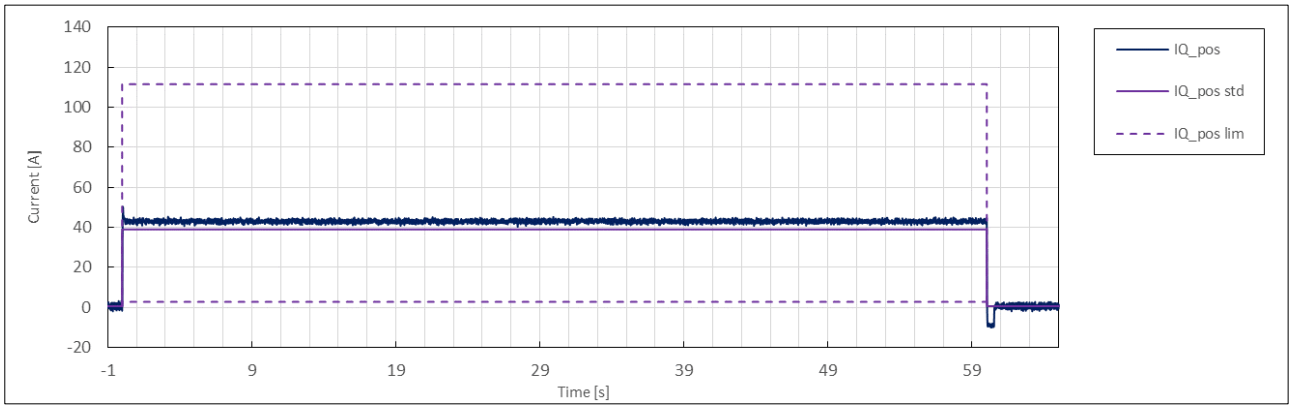

Current [A]
Time [s]
Ia
Ib
Ic

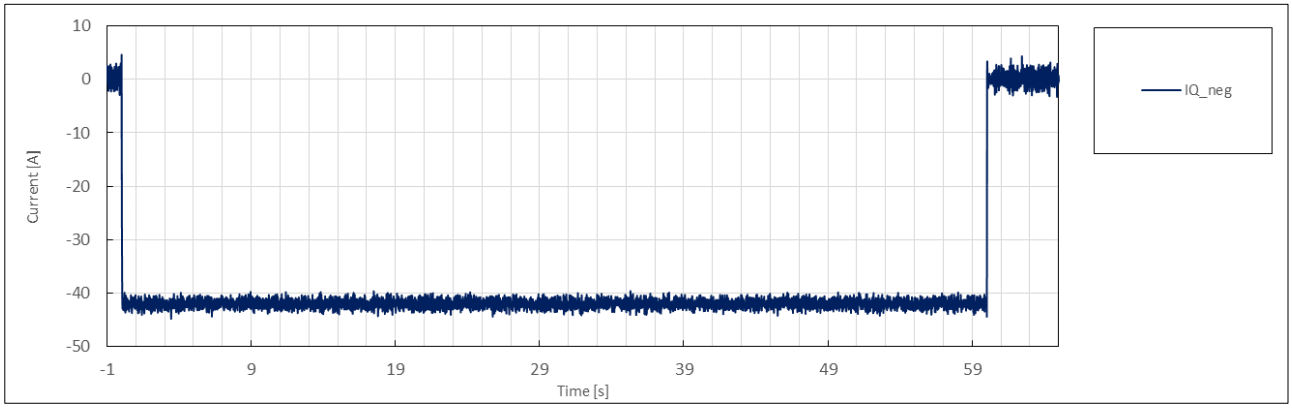

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

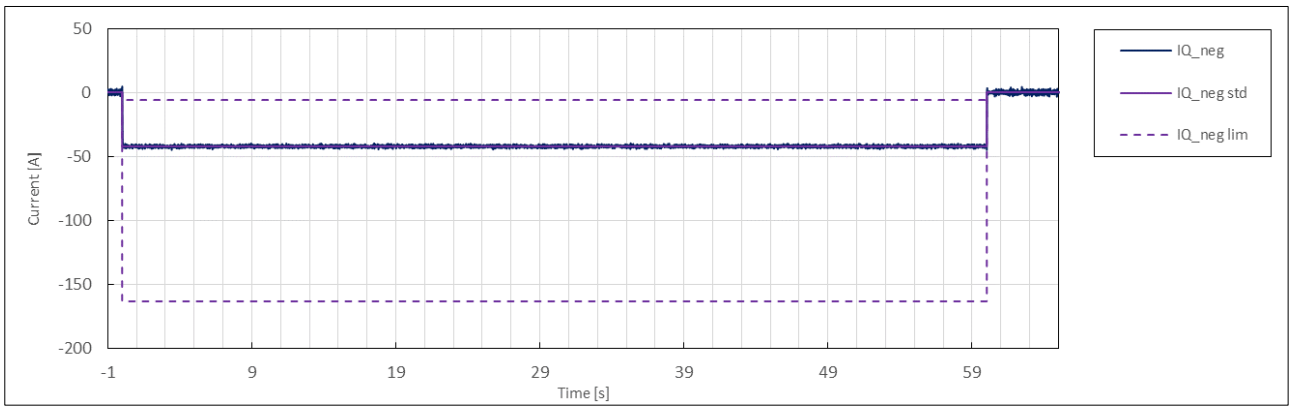

Current [A]
Time [s]
IP_pos


Current [A]
Time [s]
IP_pos
IP_posstd

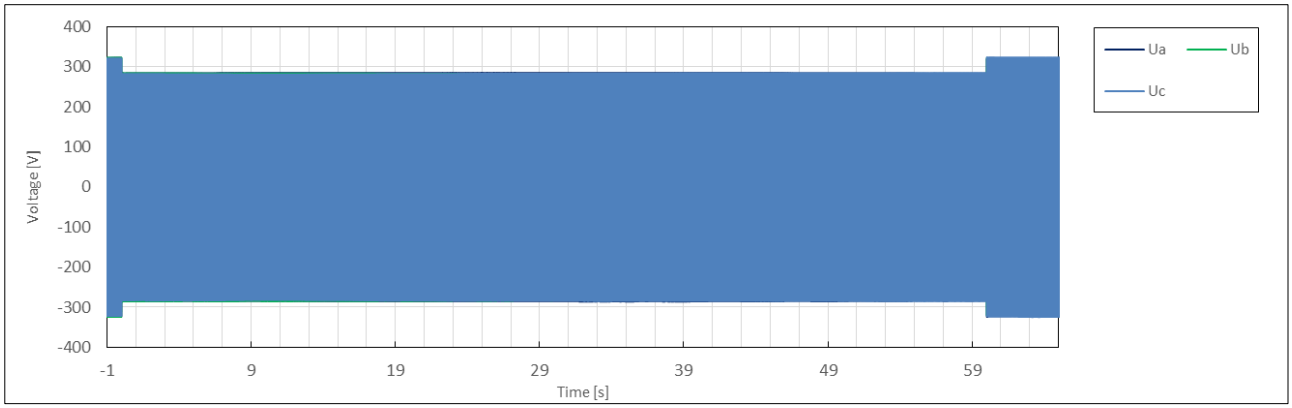

Current [A]
Time [s]
IQ_pos

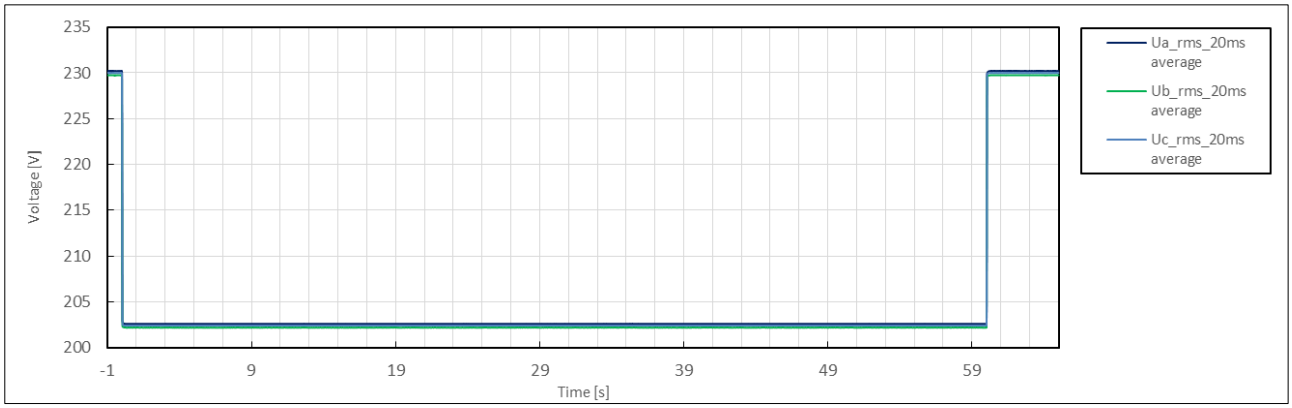

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

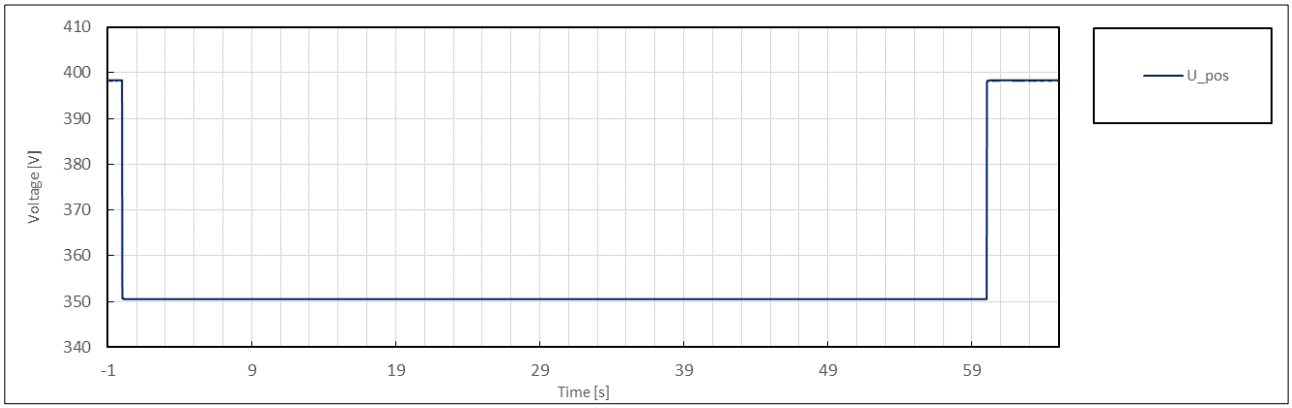

Current [A]
Time [s]
IQ_neg


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

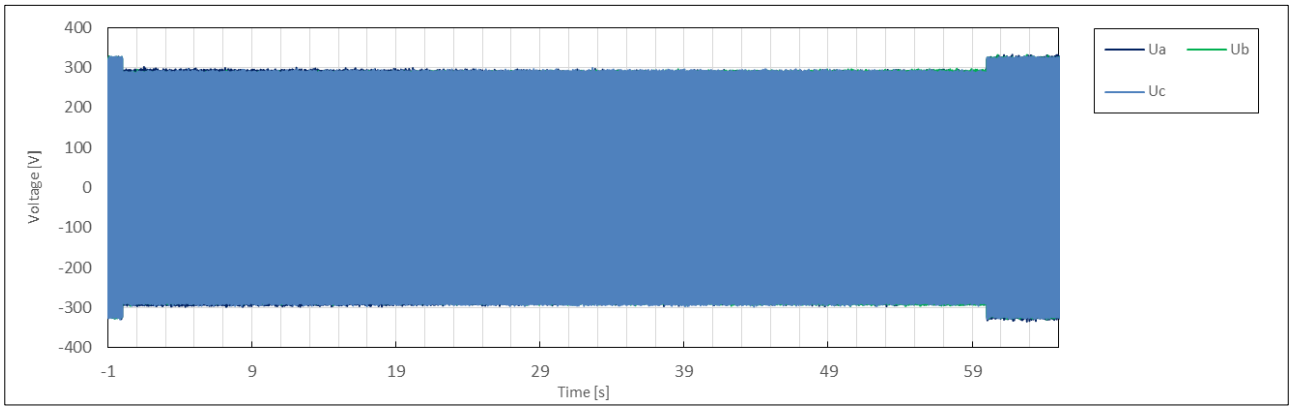
No. 5.5 Idle Test

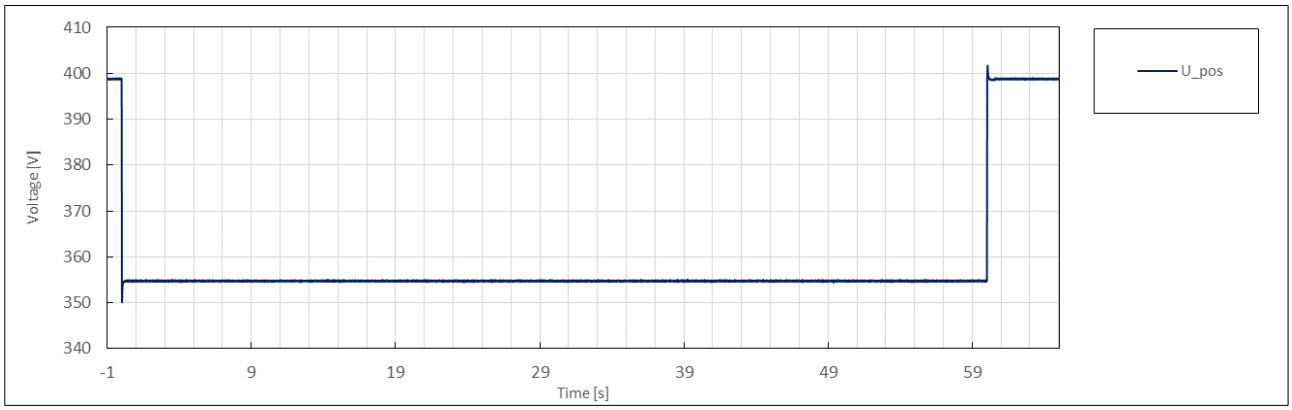


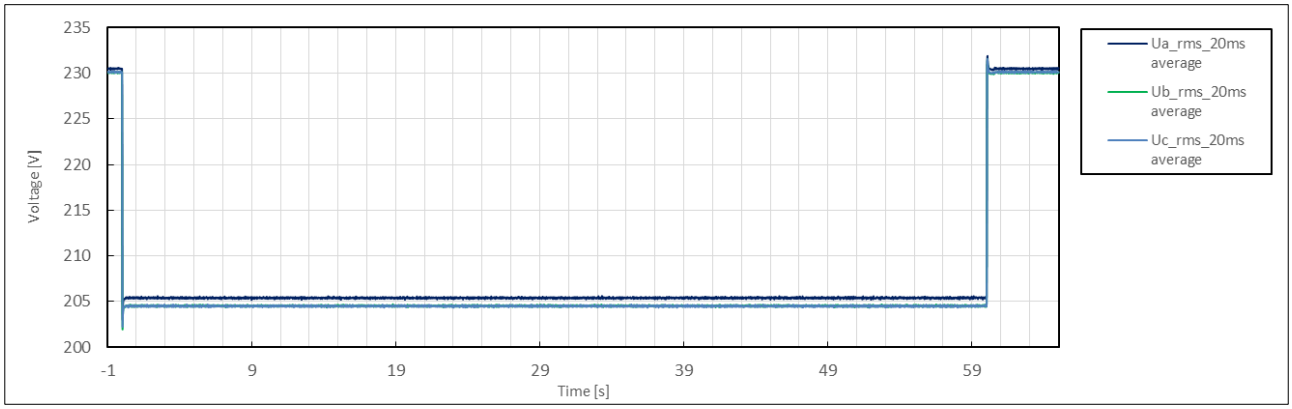


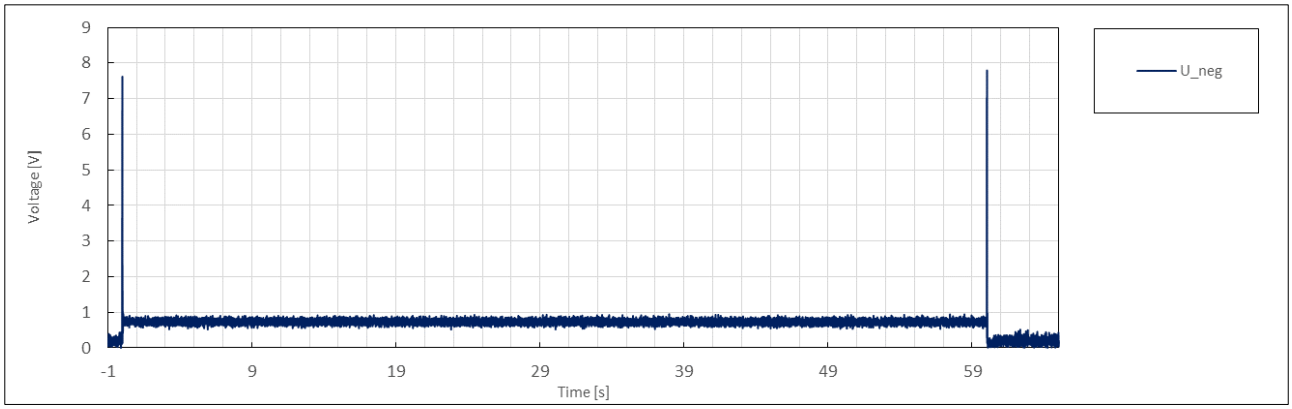


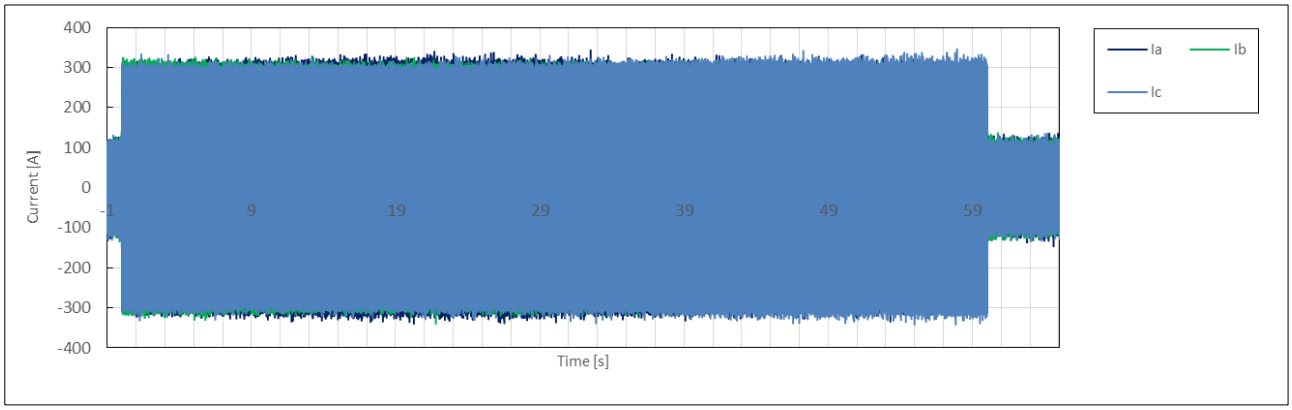
No. 5.5 Load Test

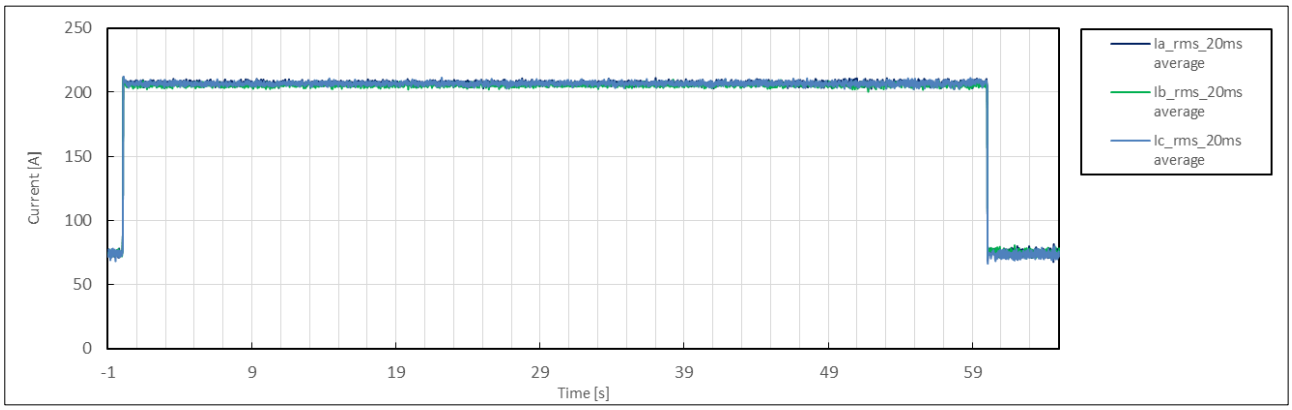


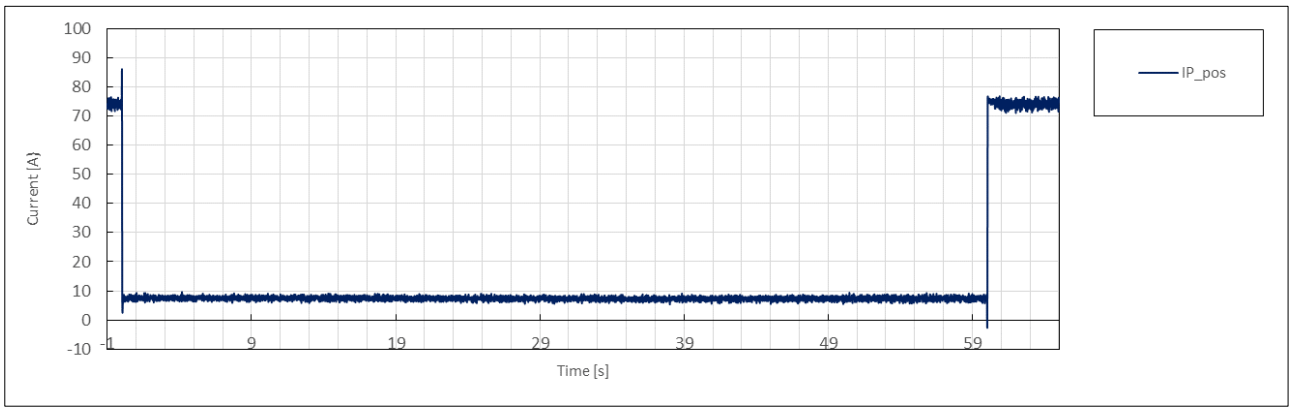


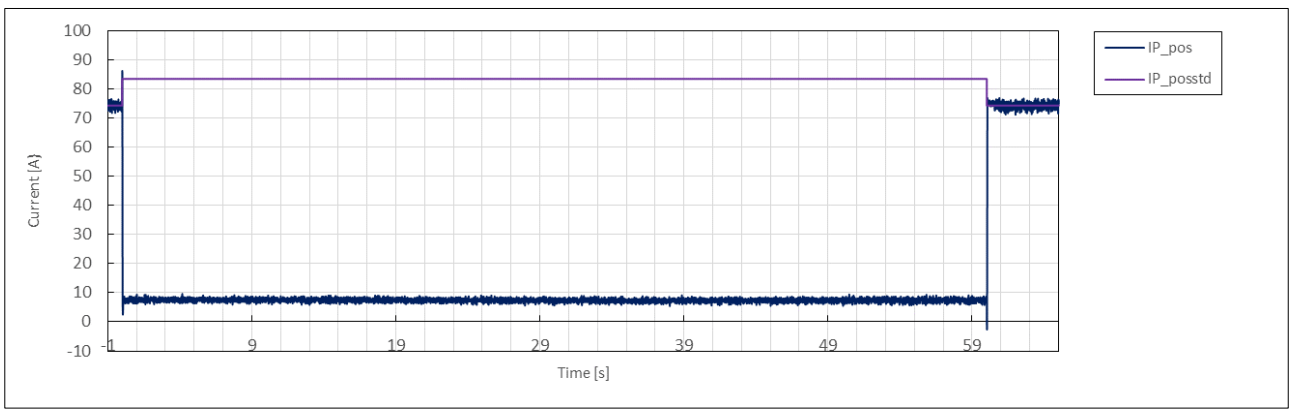


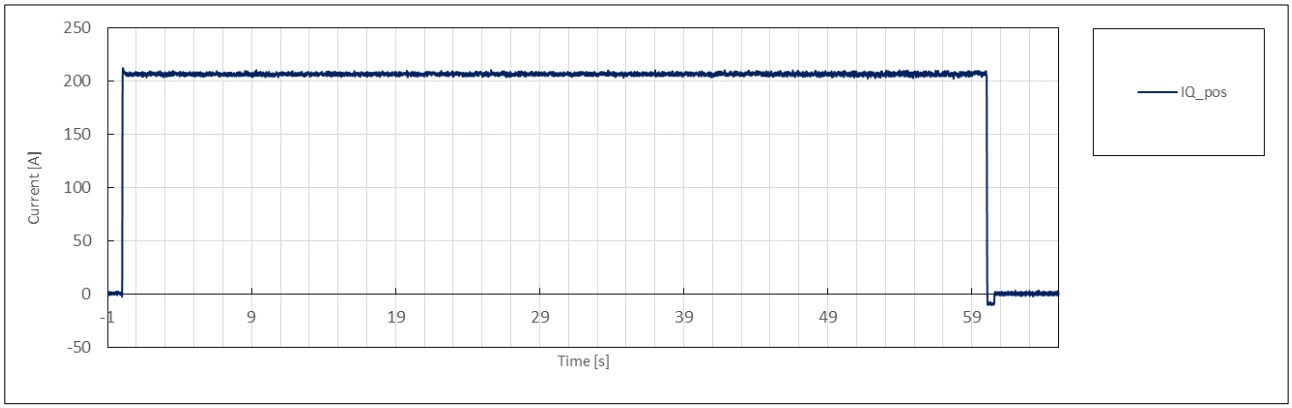


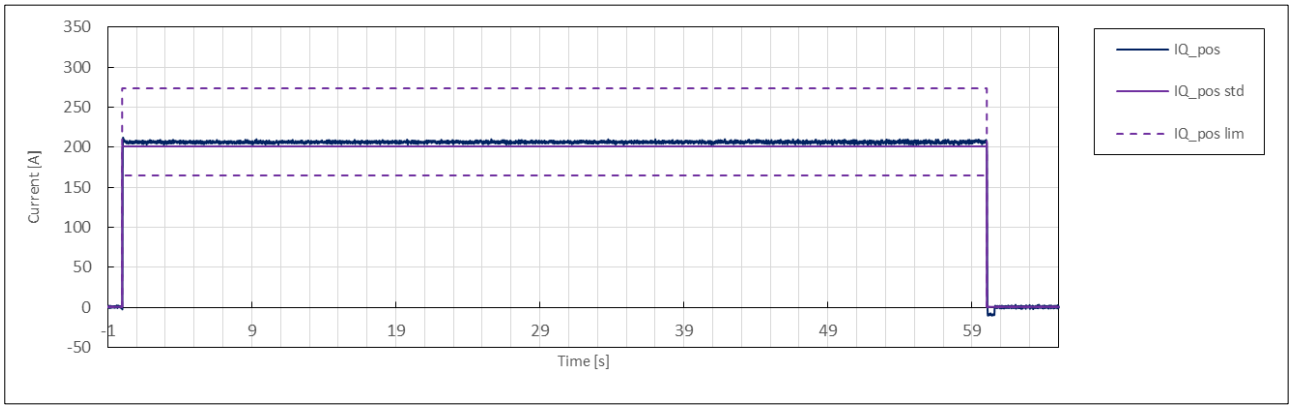

Current [A]
Time [s]
Ia
Ib
Ic

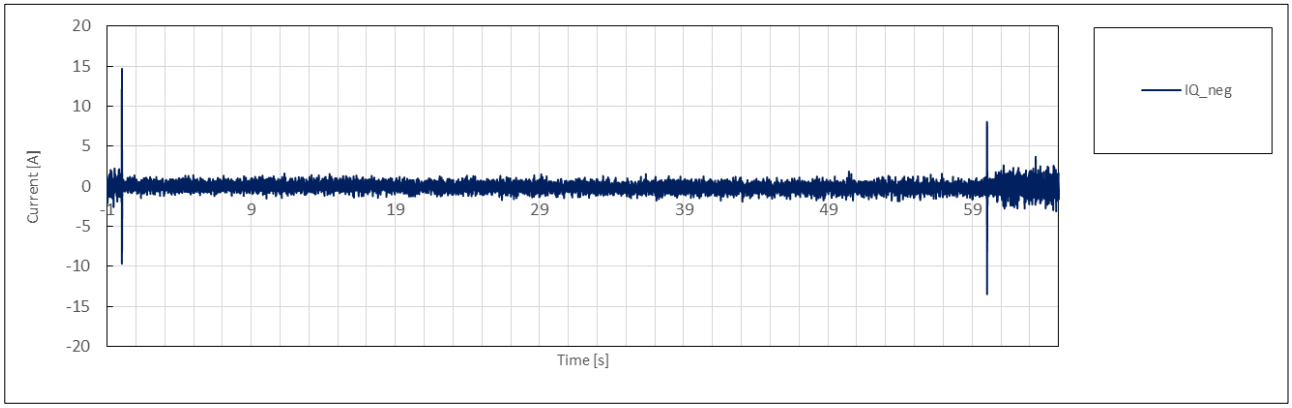

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

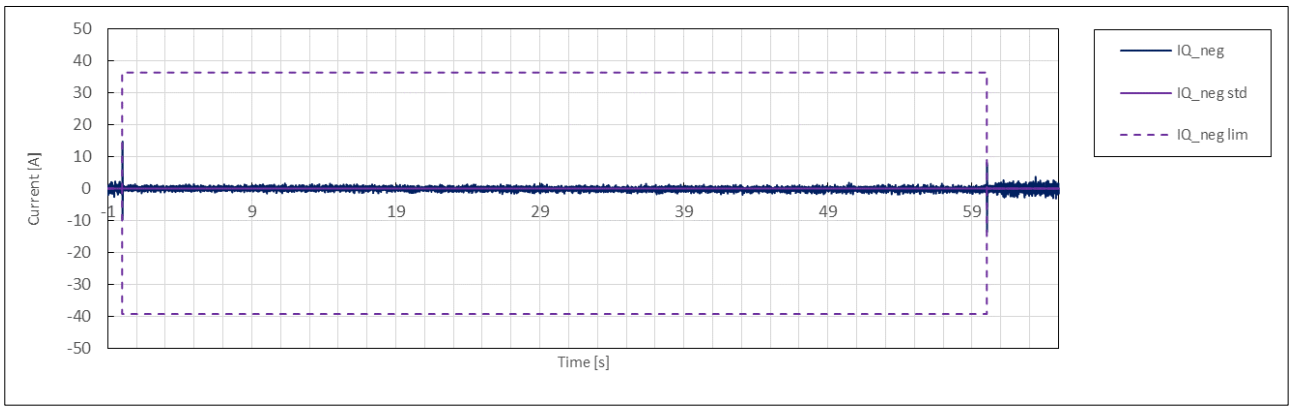

Current [A]
Time [s]
IP_pos

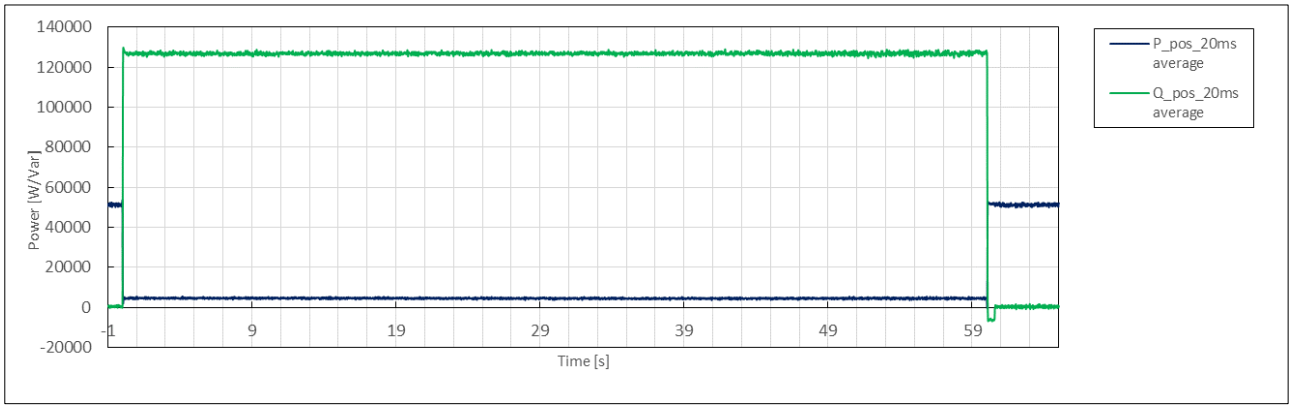

Current [A]
Time [s]
IP_pos
IP_posstd


250
200
150
100
50
0
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos

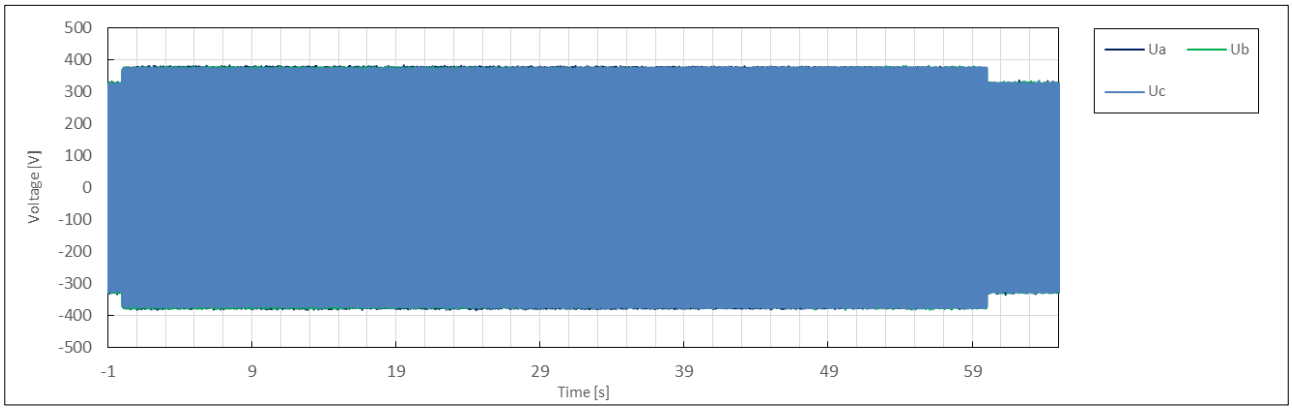

350
300
250
200
150
100
50
0
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

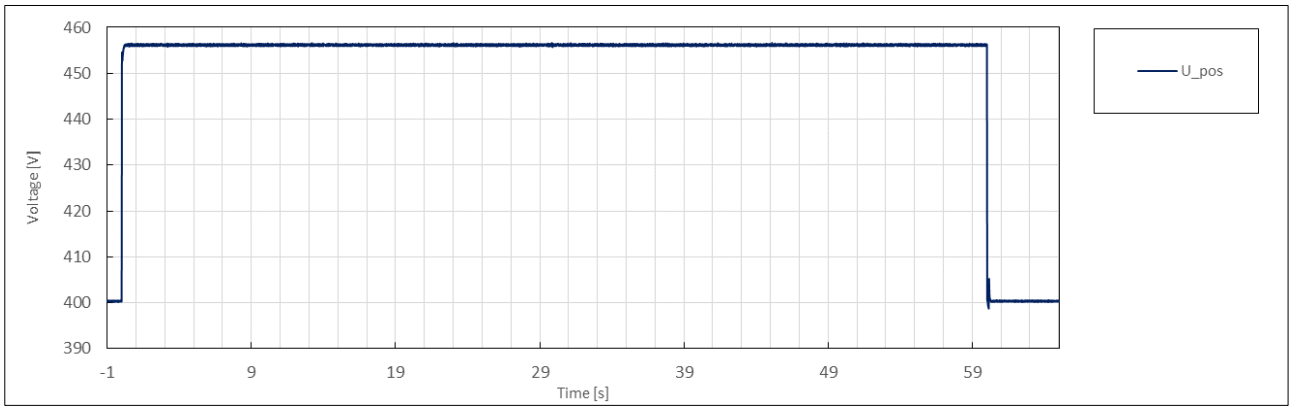

20
15
10
5
0
-5
-10
-15
-20
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg

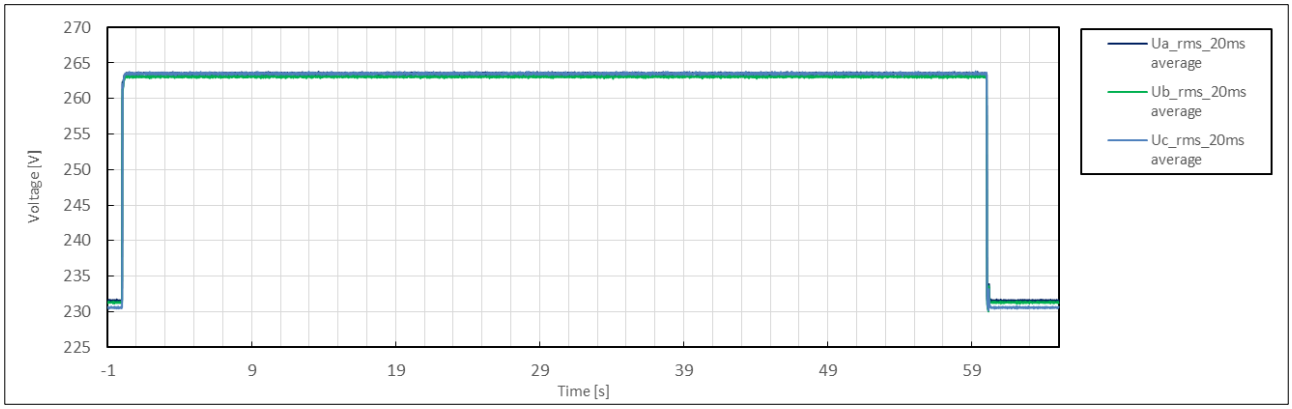

50
40
30
20
10
0
-10
-20
-30
-40
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


140000
120000
100000
80000
60000
40000
20000
0
-20000
Power [W/Var]
-1
9
19
29
39
49
59
Time [s]
P_pos_20ms average
Q_pos_20ms average

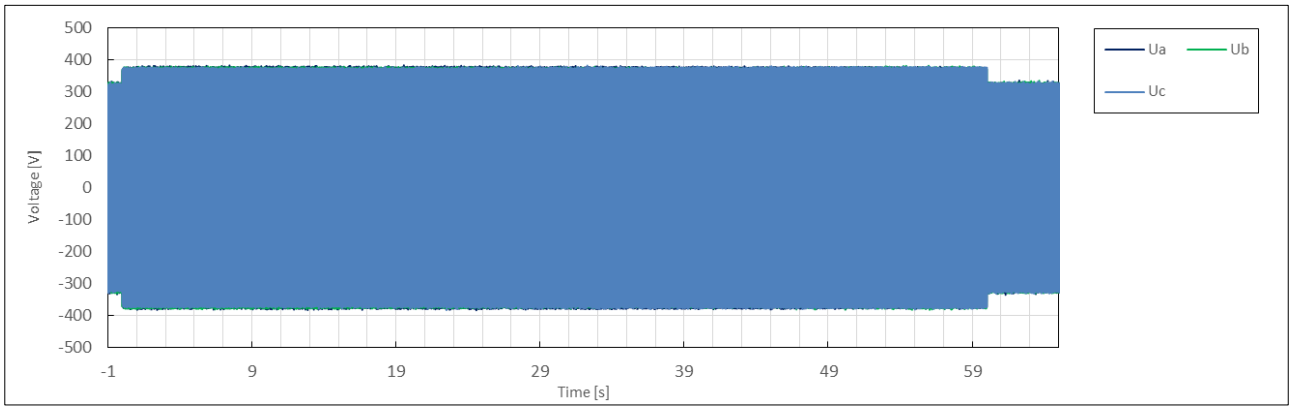
No. 6.1 Idle Test

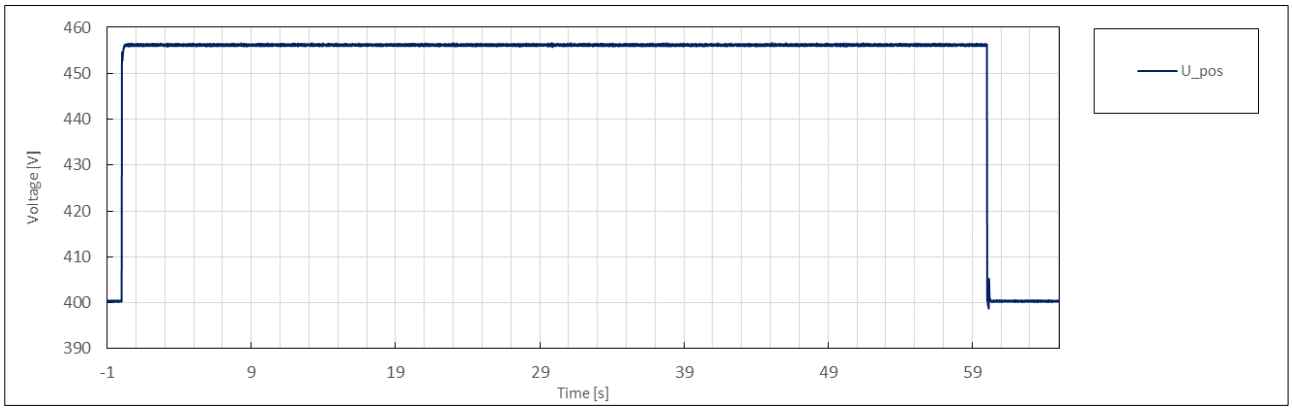


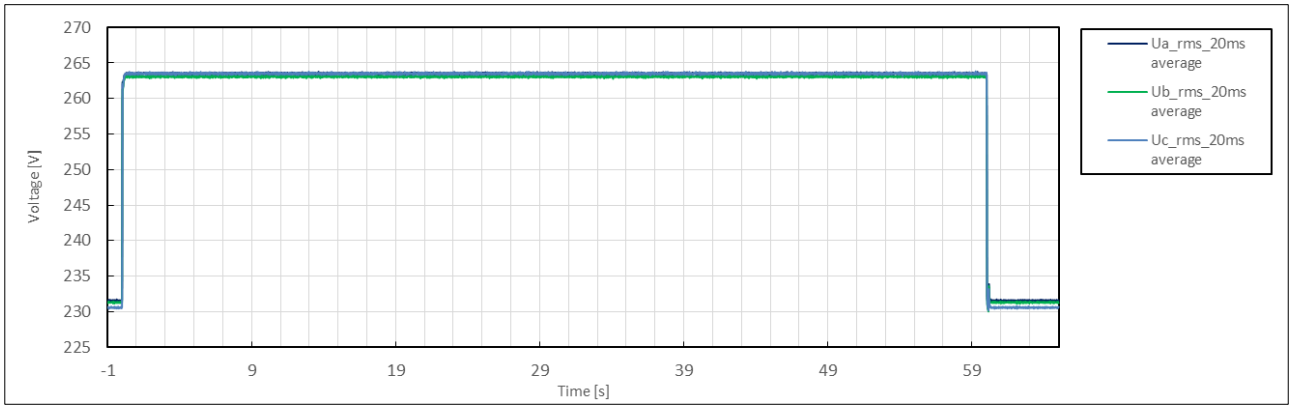


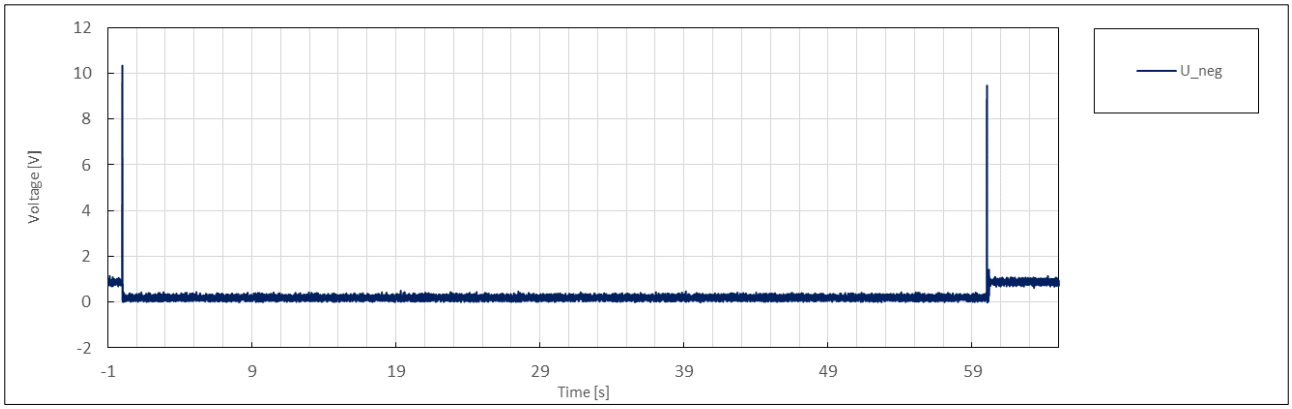


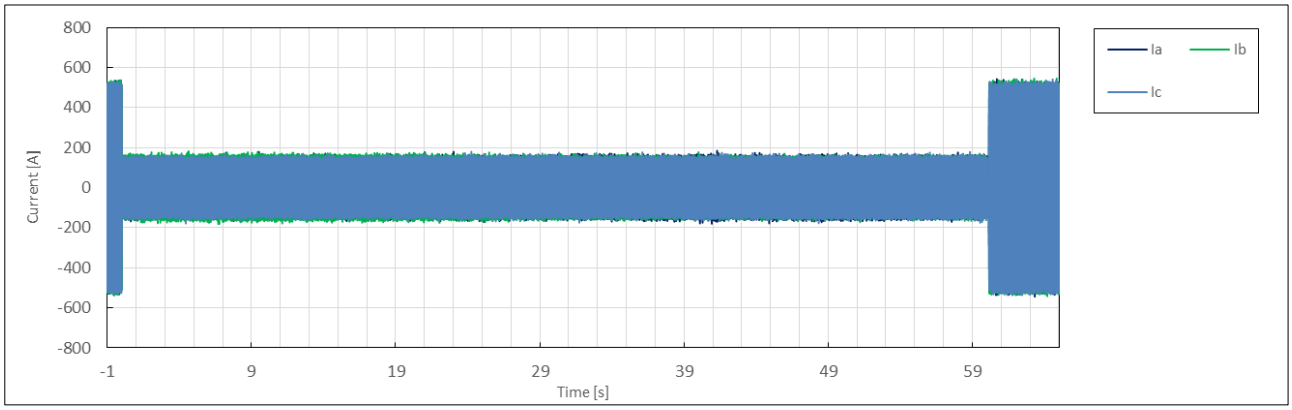
No. 6.1 Load Test

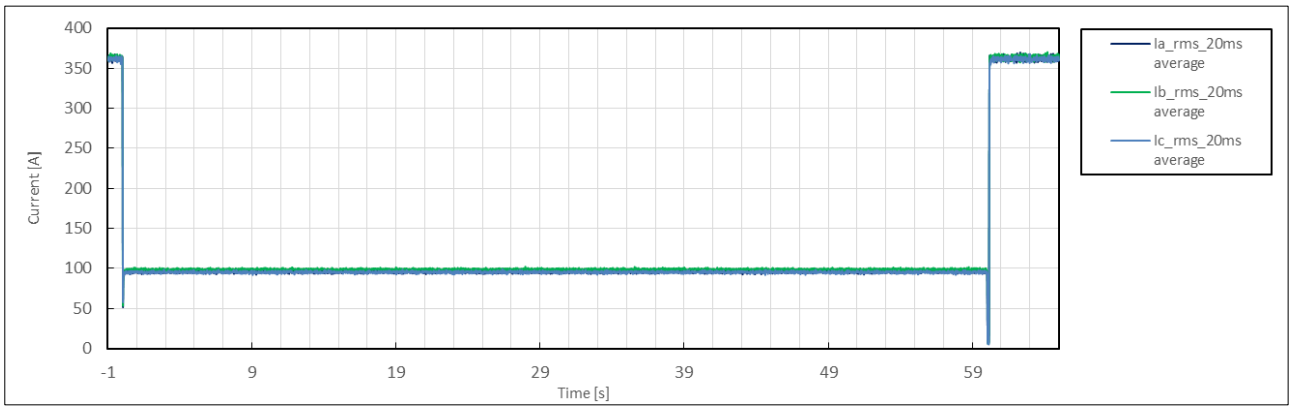


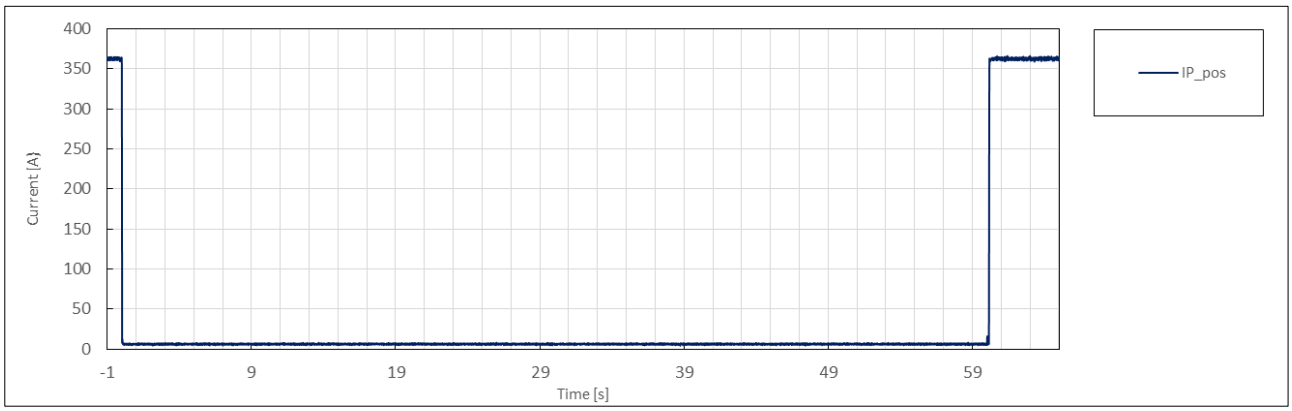


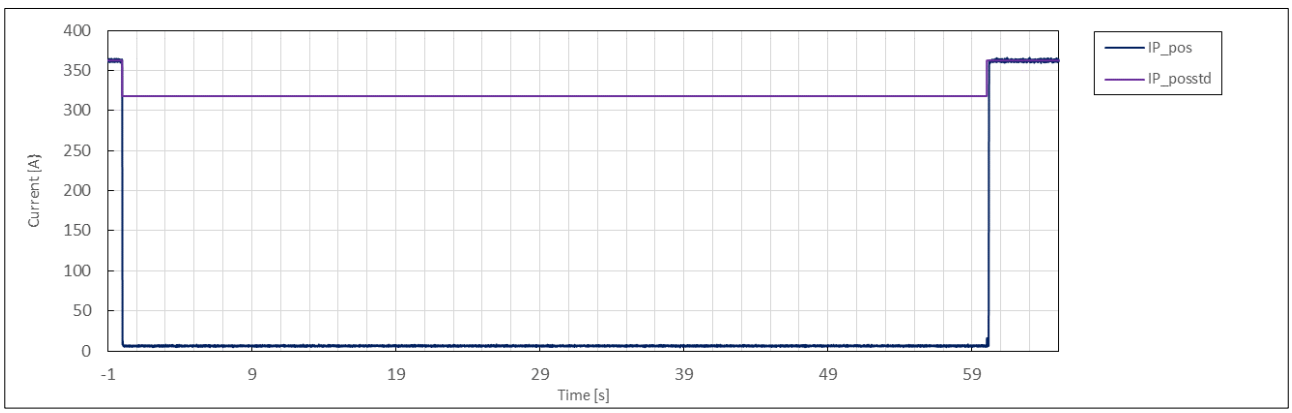


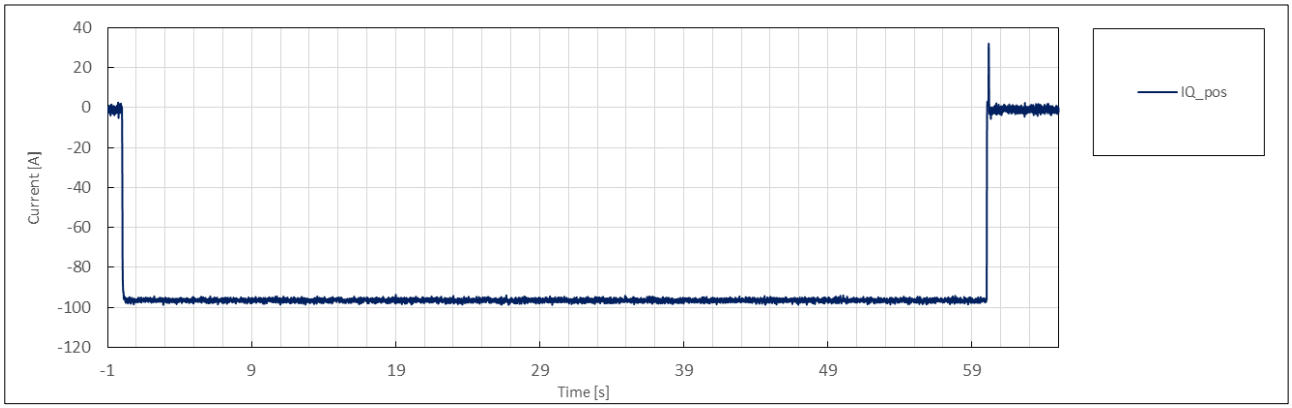


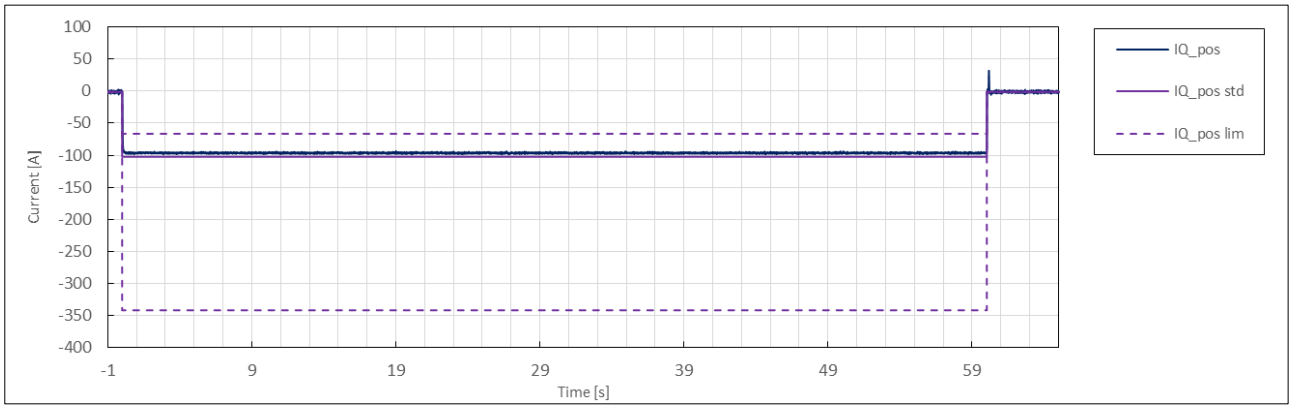

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
9
19
29
39
49
59
Time [s]
Ia
Ib
Ic

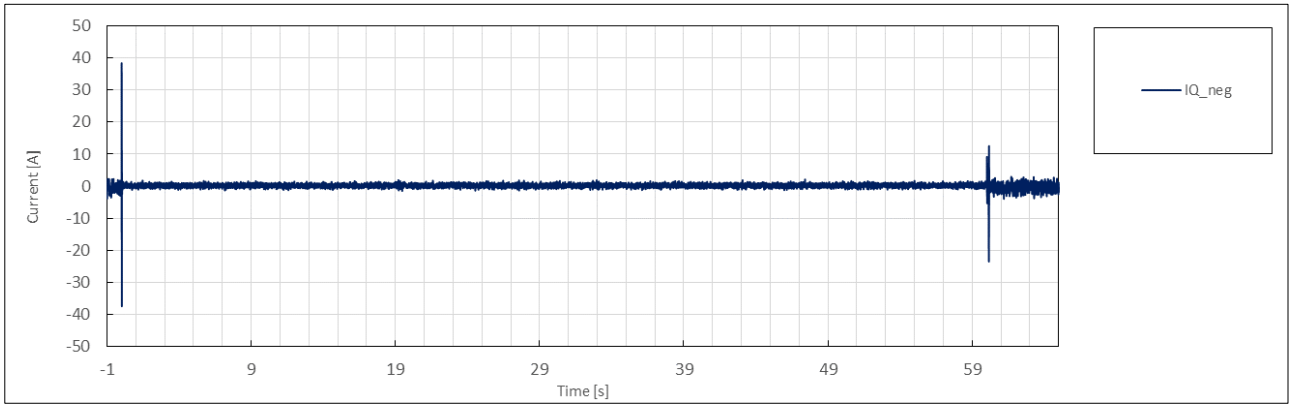

400
350
300
250
200
150
100
50
0
Current [A]
-1
9
19
29
39
49
59
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

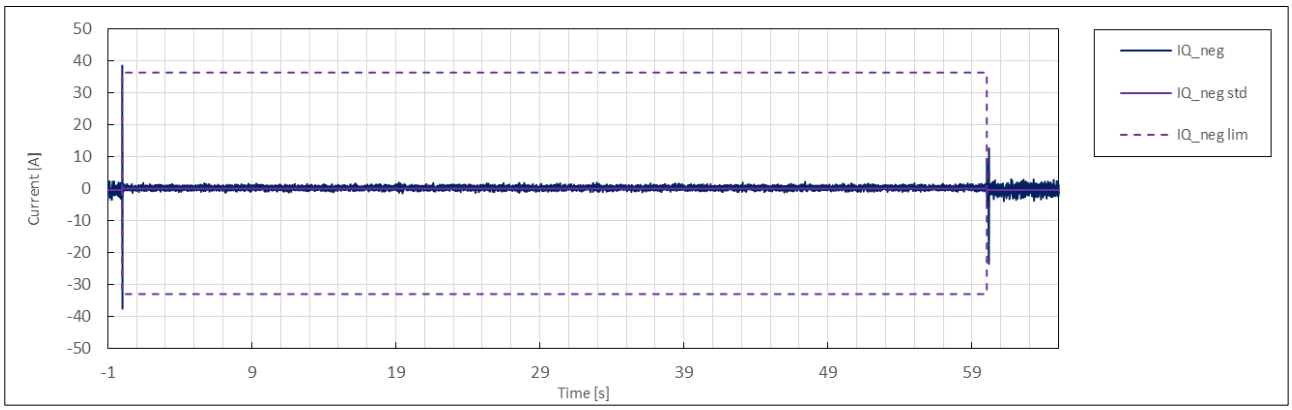

400
350
300
250
200
150
100
50
0
Current [A]
-1
9
19
29
39
49
59
Time [s]
IP_pos

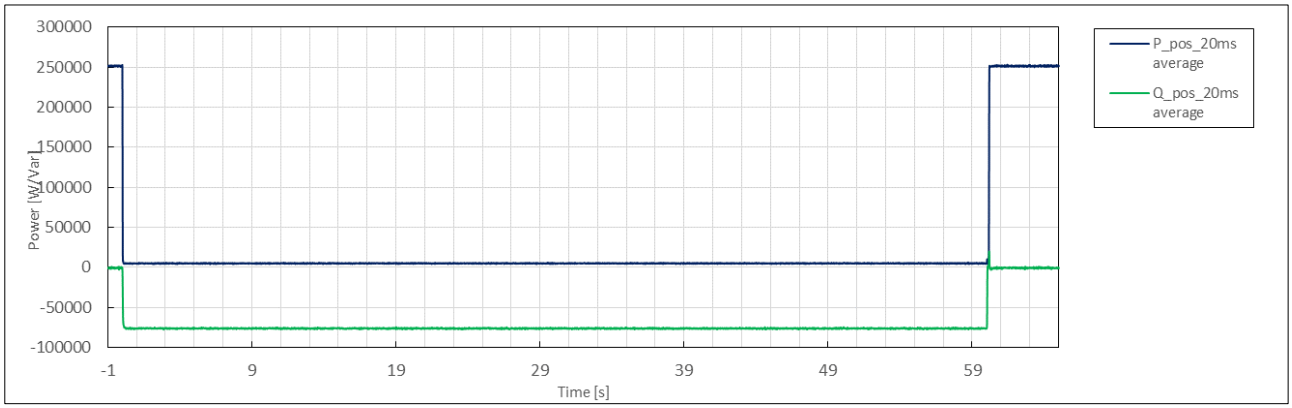

400
350
300
250
200
150
100
50
0
Current [A]
-1
9
19
29
39
49
59
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

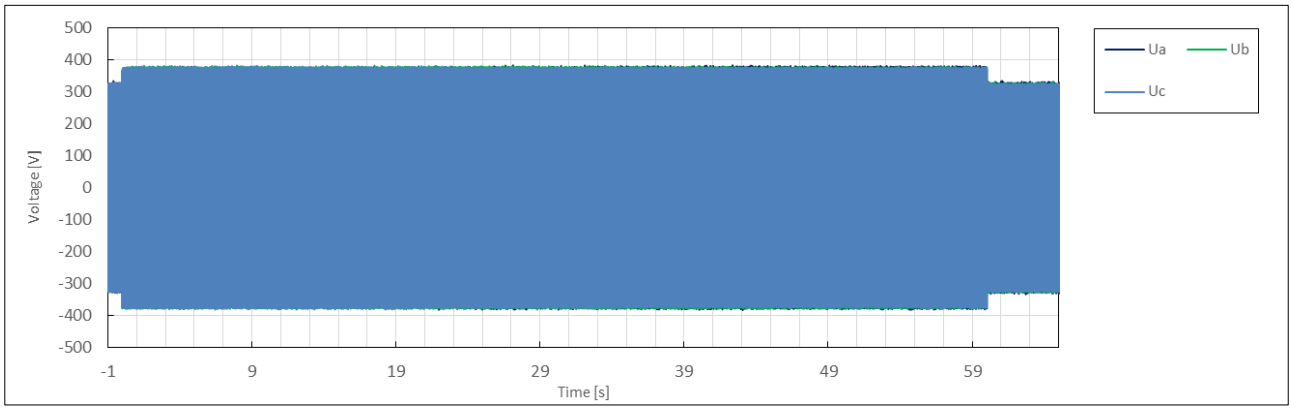

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

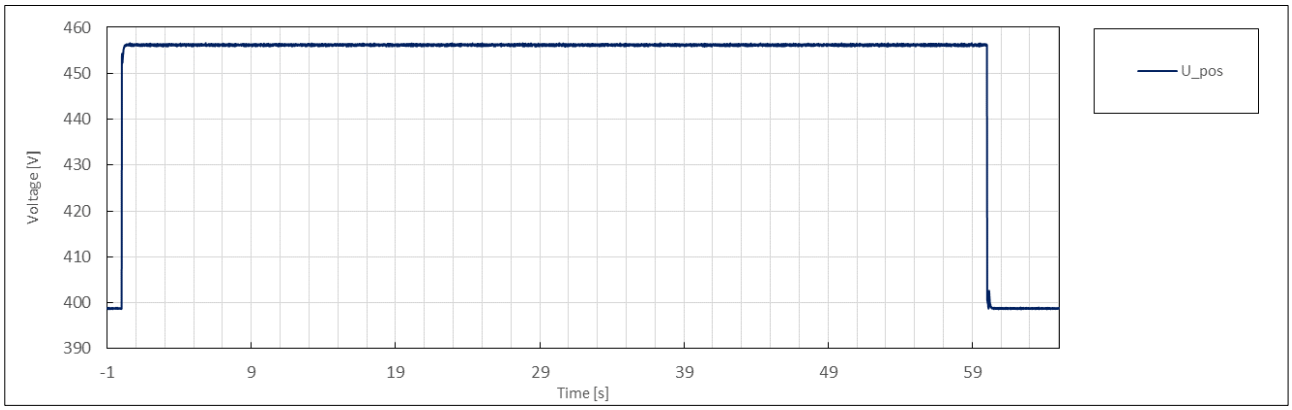

Current [A]
Time [s]
IQ_neg

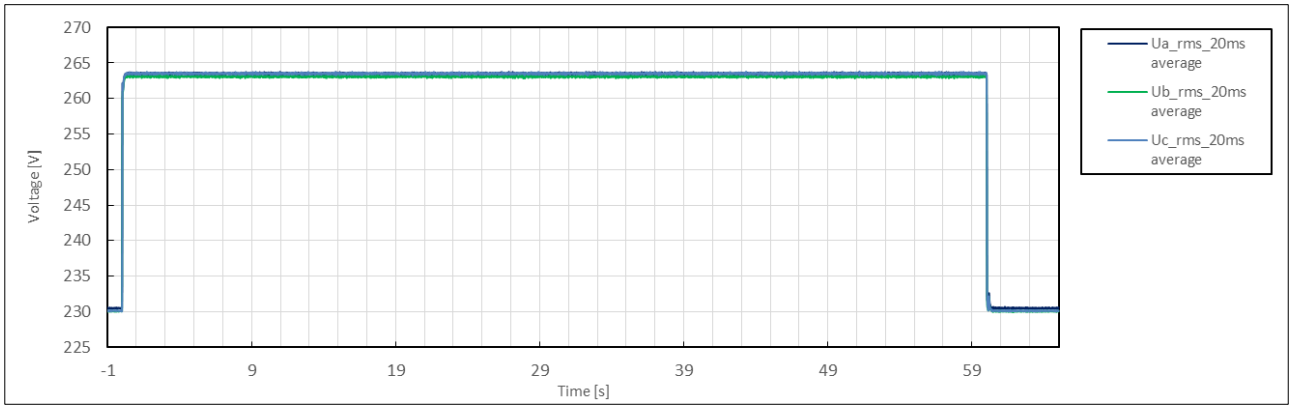

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
Power [W/Var]
-1
9
19
29
39
49
59
Time [s]
P_pos_20ms average
Q_pos_20ms average

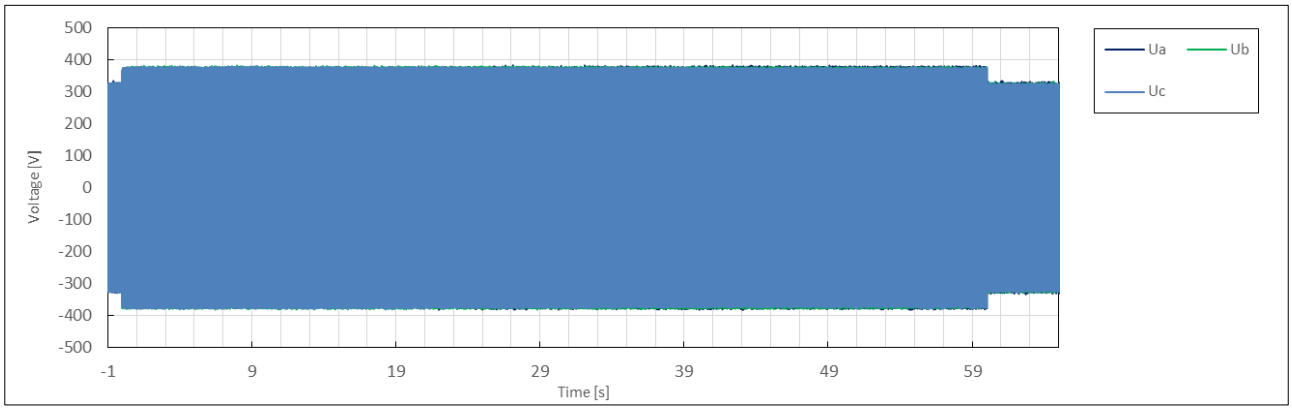
No. 6.2 Idle Test

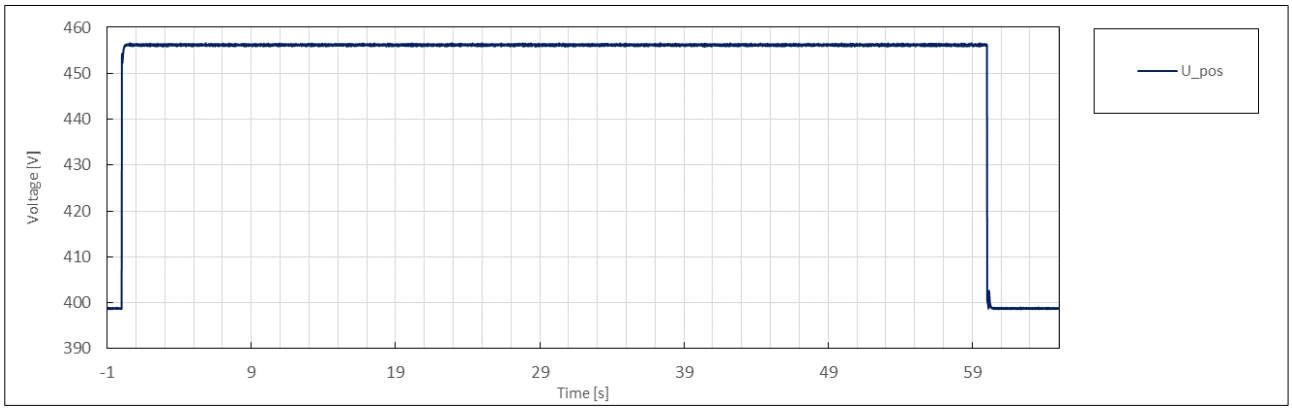


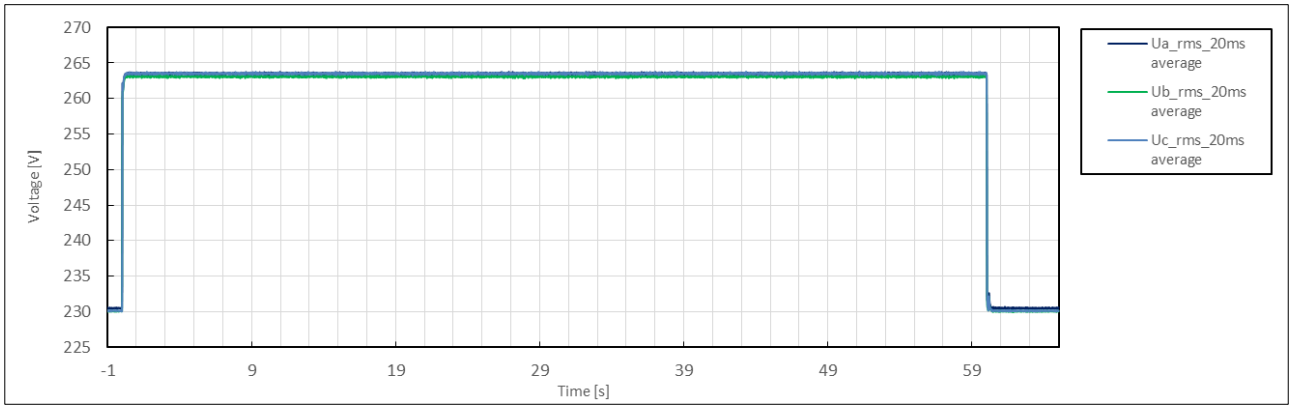


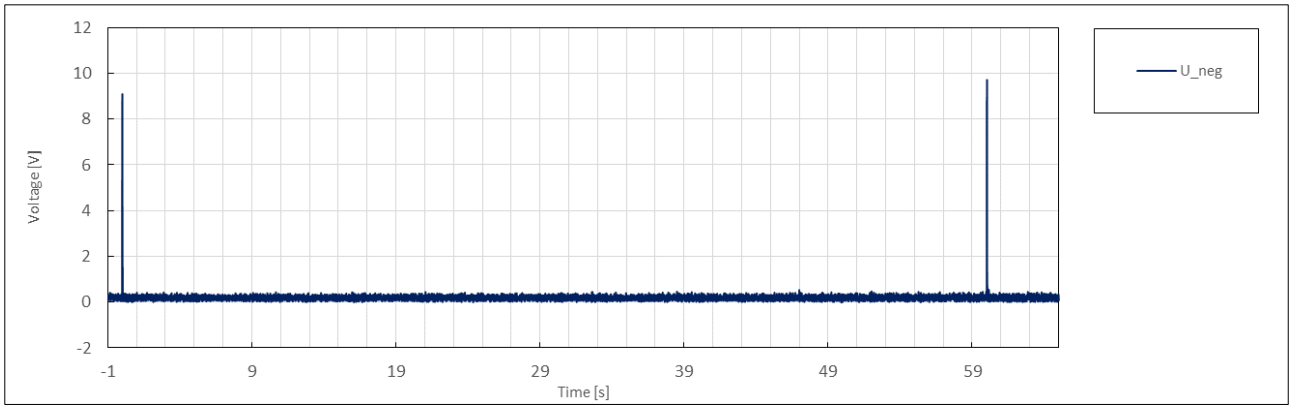


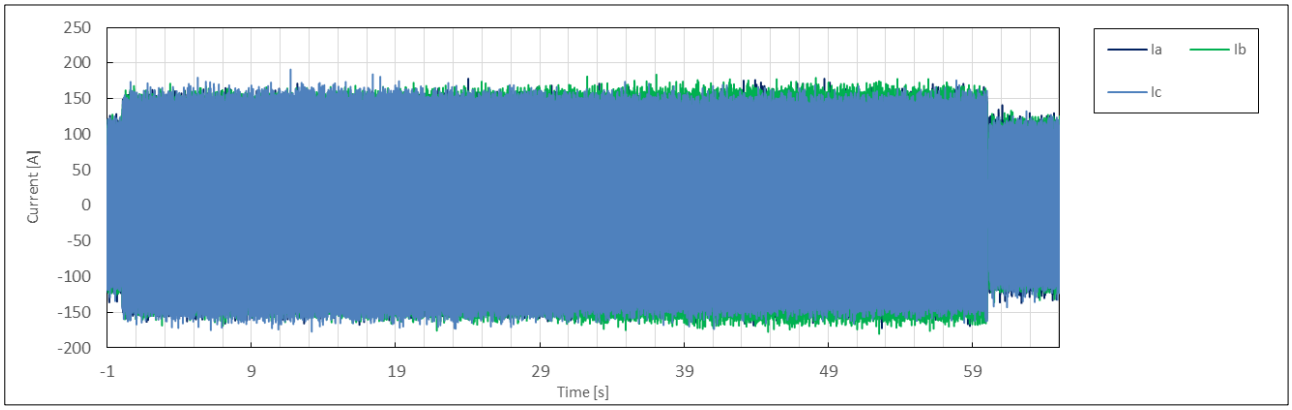
No. 6.2 Load Test

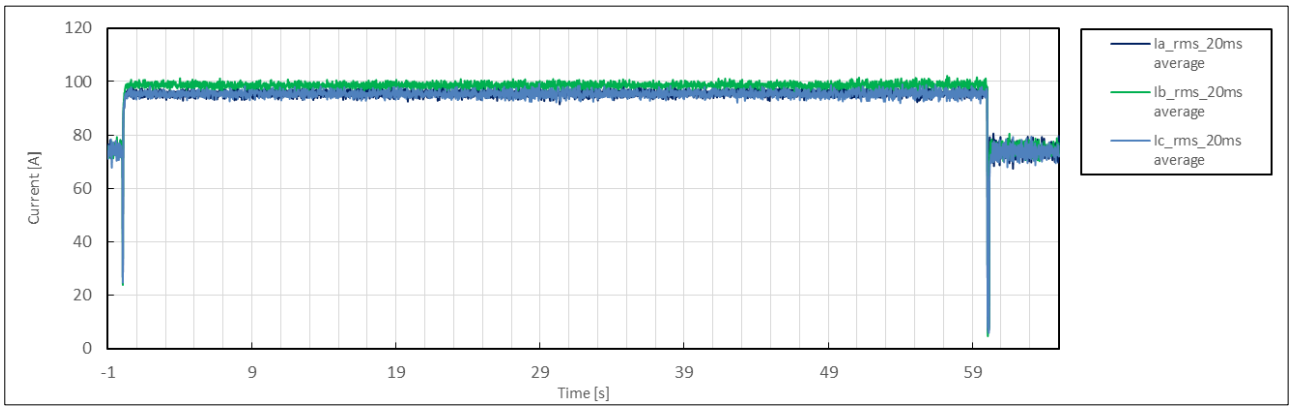


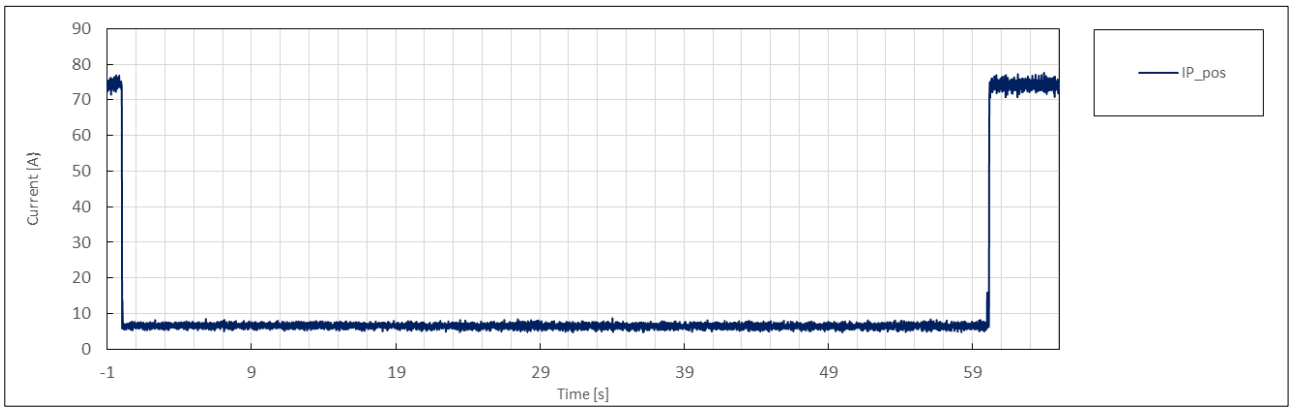


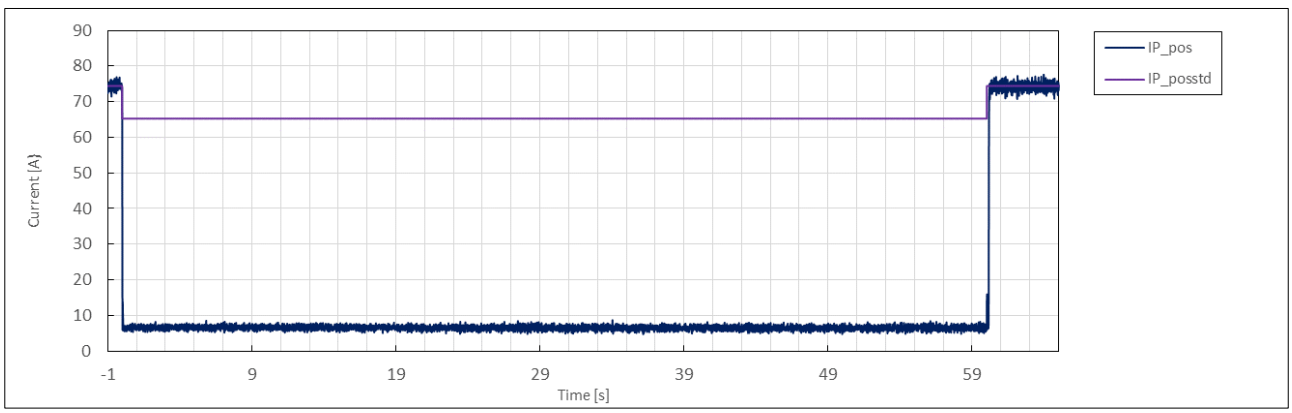


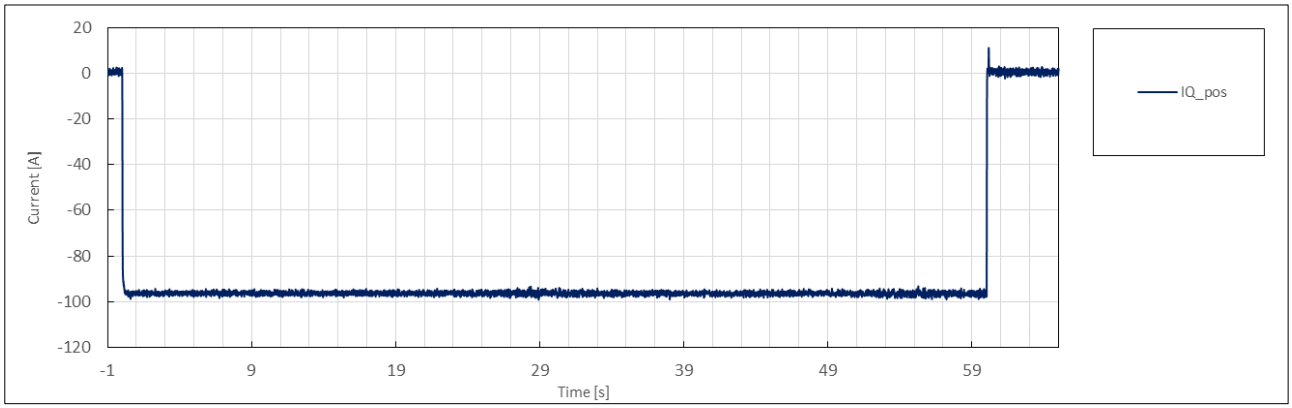


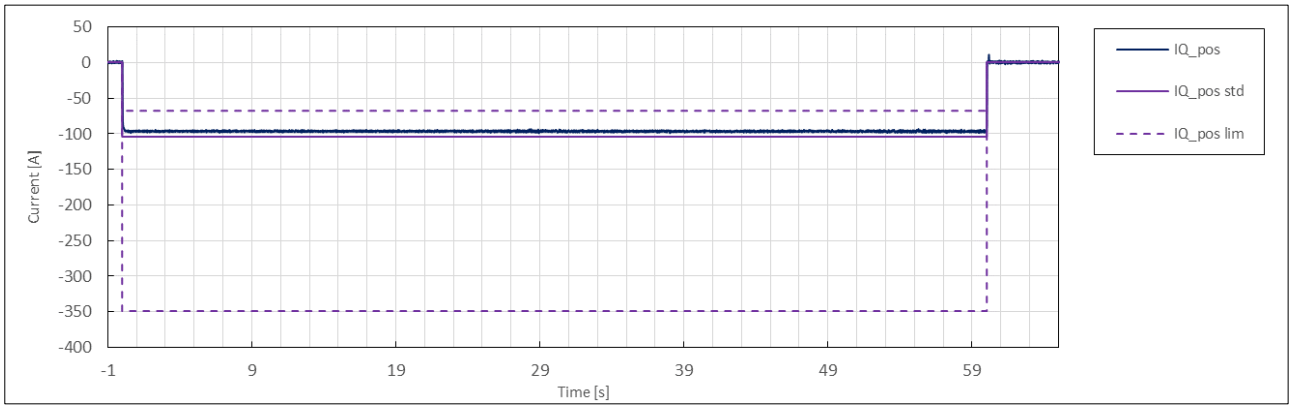

Current [A]
Time [s]
Ia
Ib
Ic

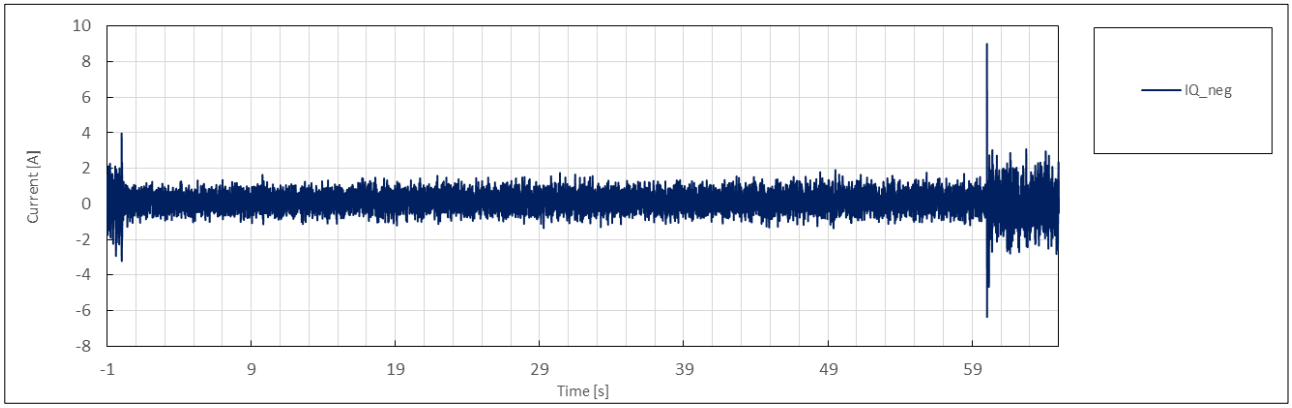

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

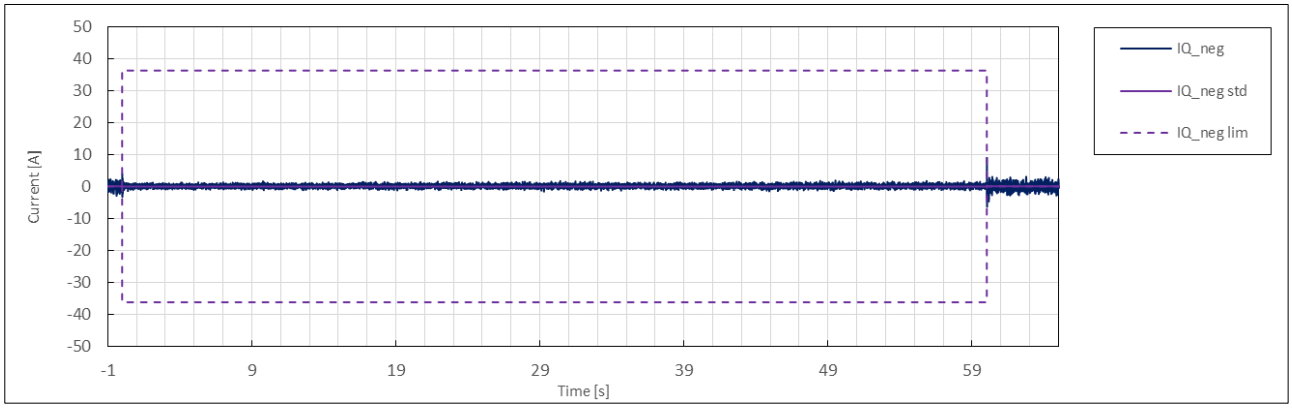

Current [A]
Time [s]
IP_pos

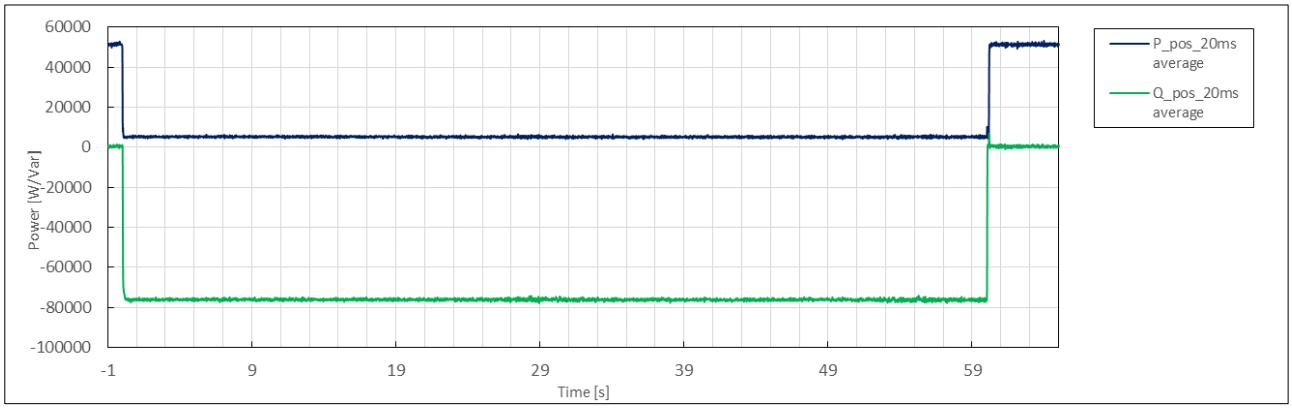

Current [A]
Time [s]
IP_pos
IP_posstd


20
0
-20
-40
-60
-80
-100
-120
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos

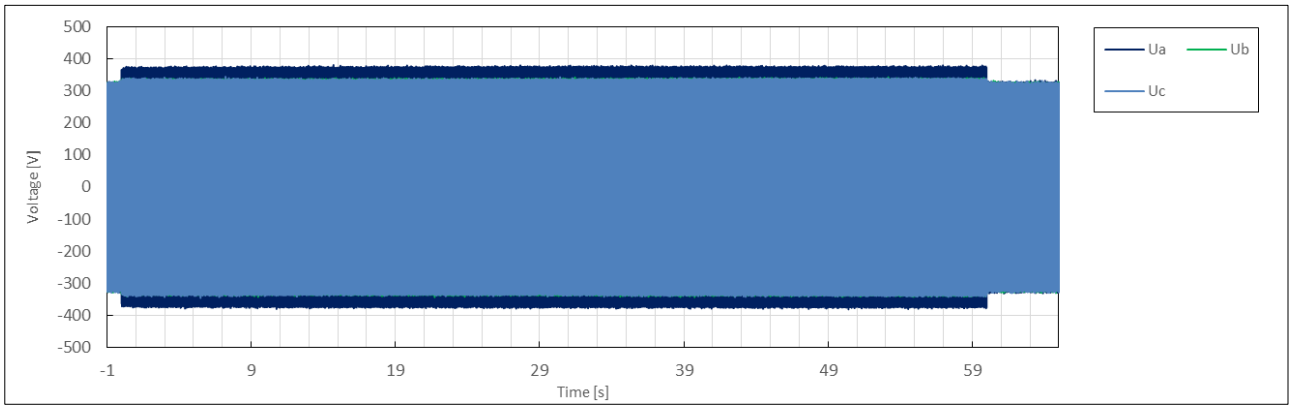

50
0
-50
-100
-150
-200
-250
-300
-350
-400
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

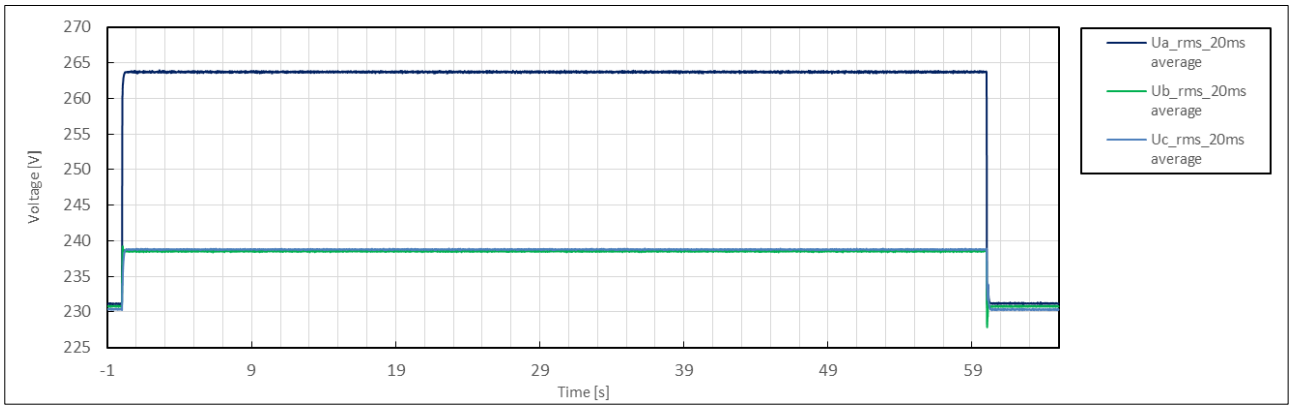

10
8
6
4
2
0
-2
-4
-6
-8
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg

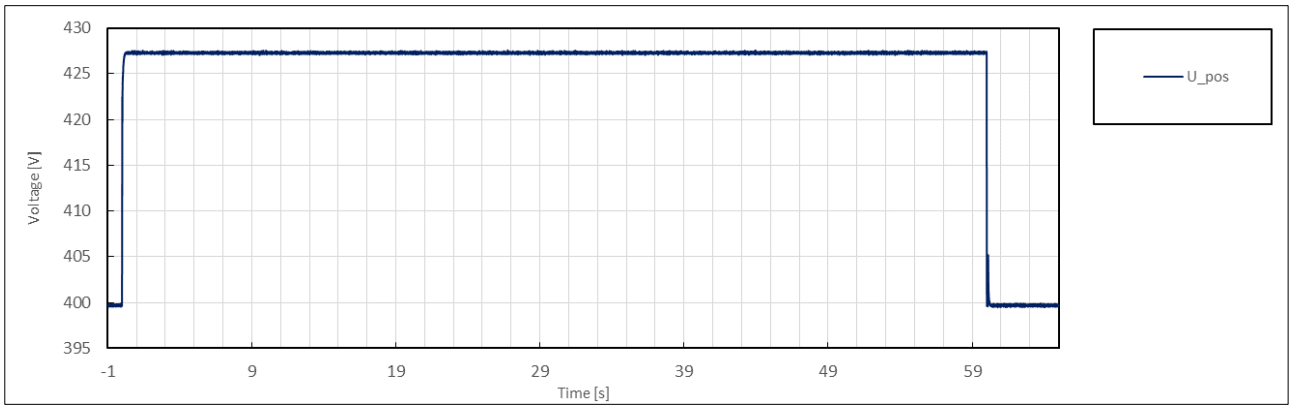

50
40
30
20
10
0
-10
-20
-30
-40
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


60000
40000
20000
0
-20000
-40000
-60000
-80000
-100000
Power [W/Var]
-1
9
19
29
39
49
59
Time [s]
P_pos_20ms average
Q_pos_20ms average

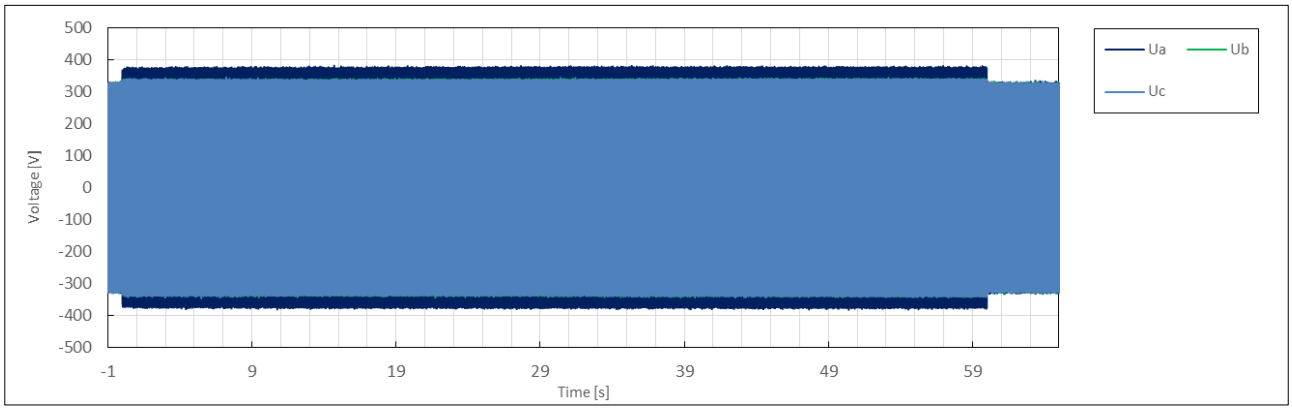
No. 6.3 Idle Test

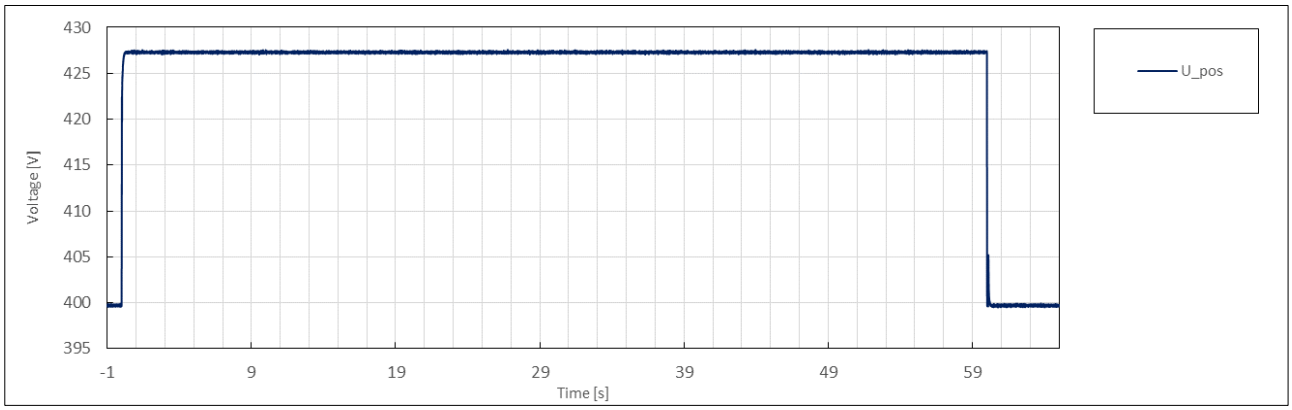


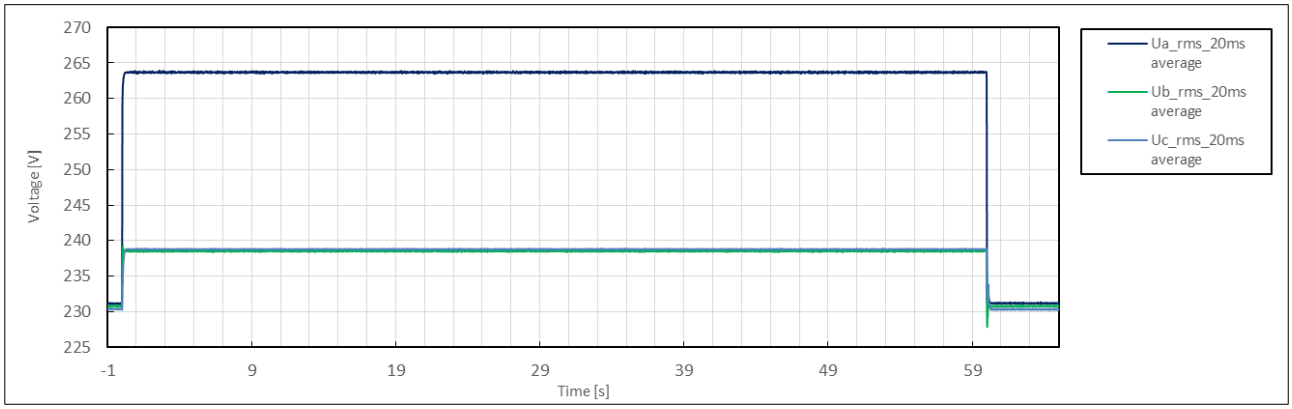


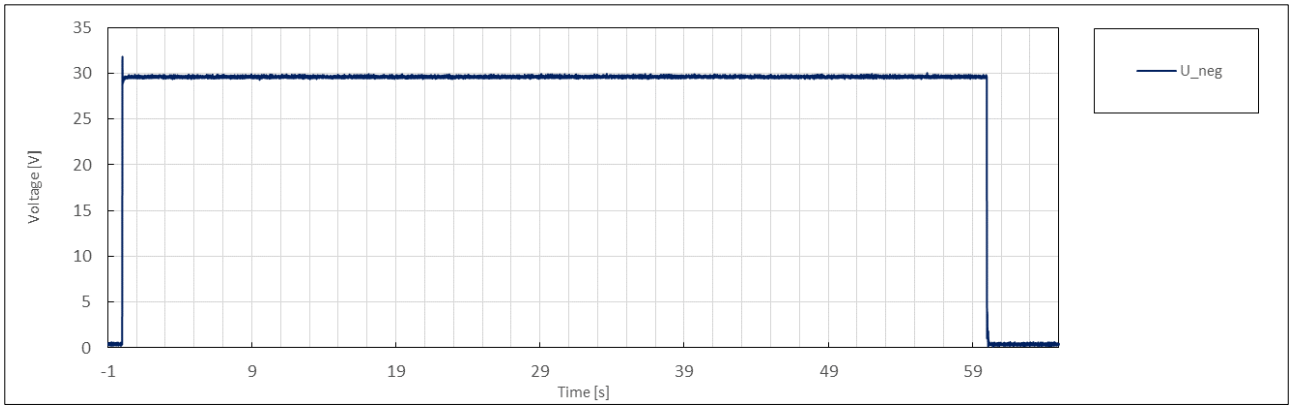


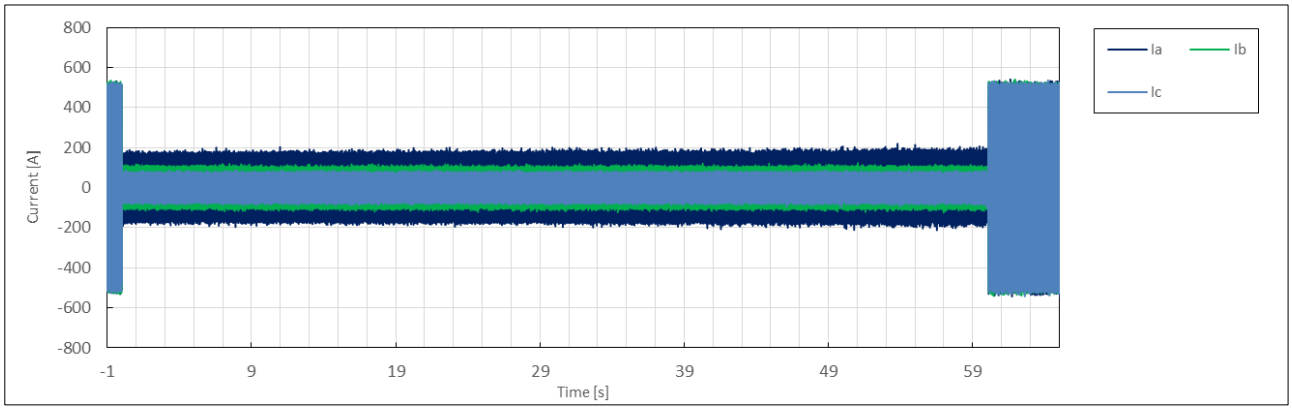
No. 6.3 Load Test

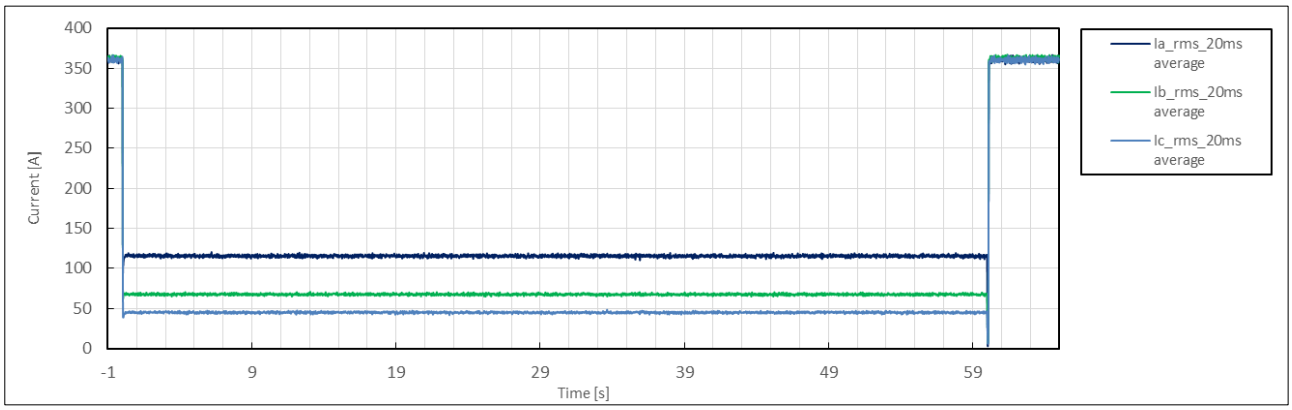


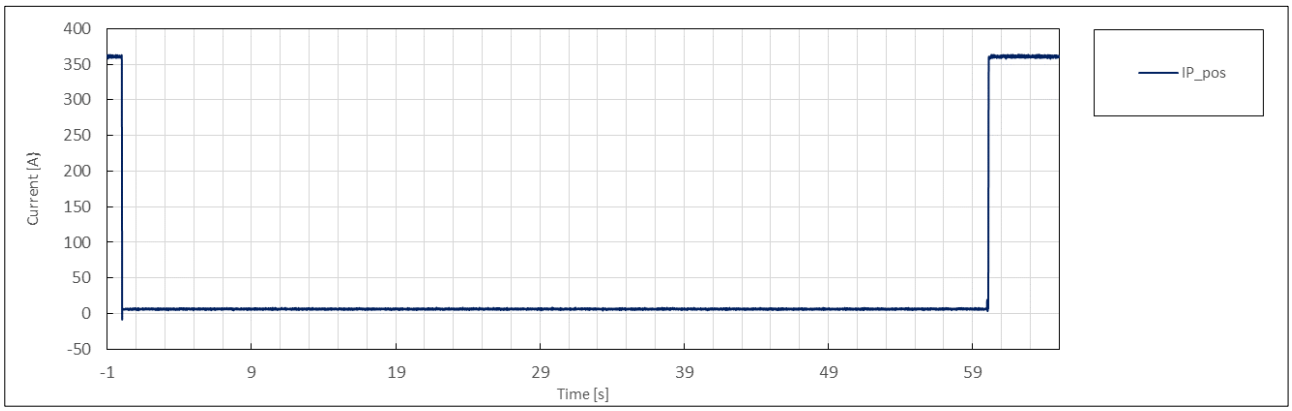


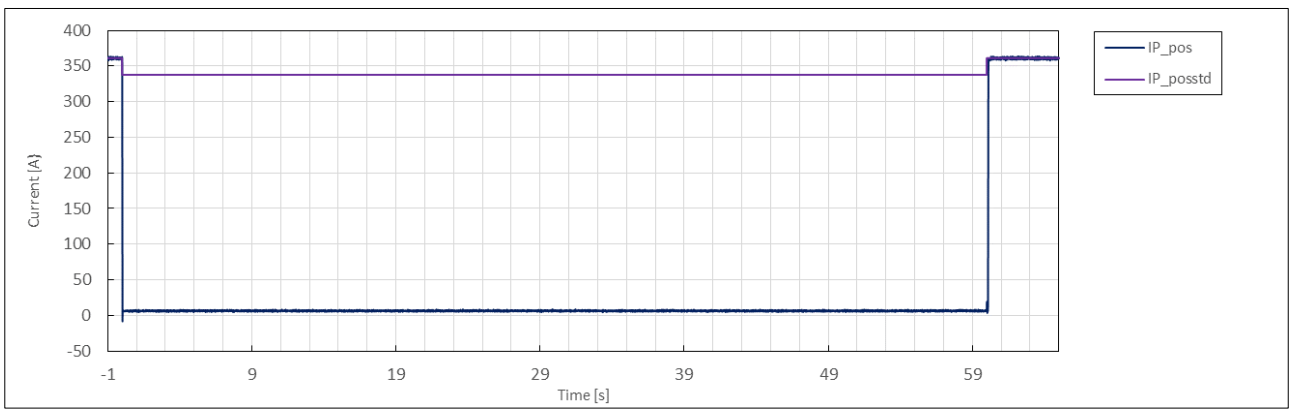


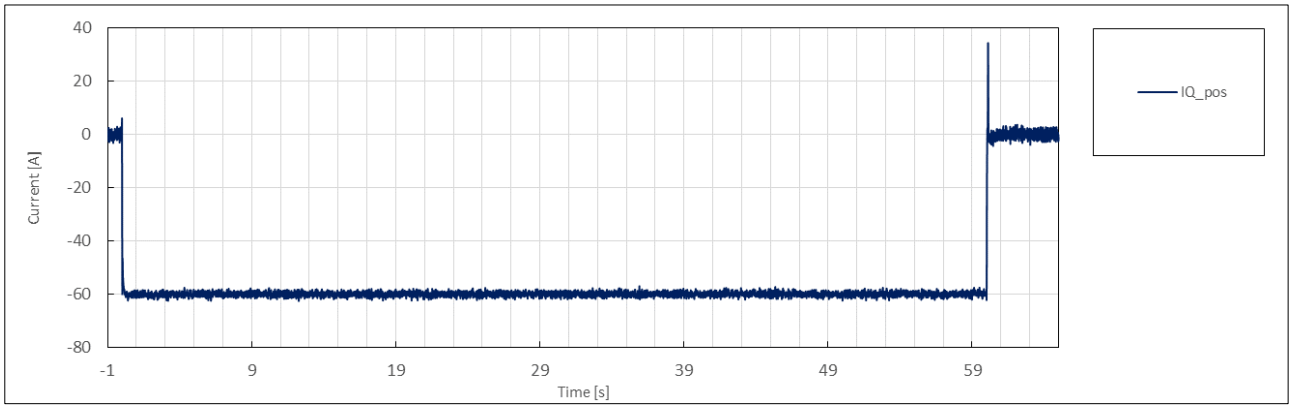


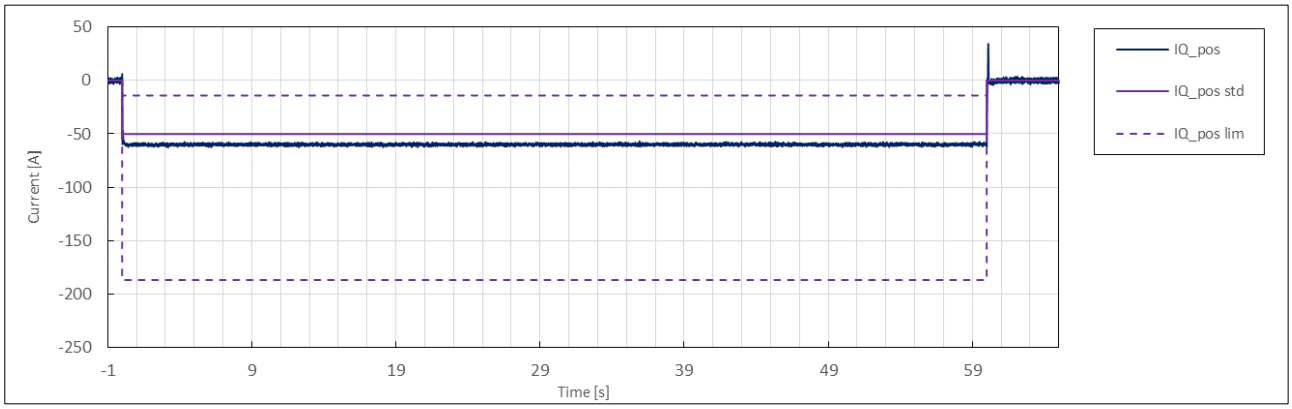

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
9
19
29
39
49
59
Time [s]
Ia
Ib
Ic

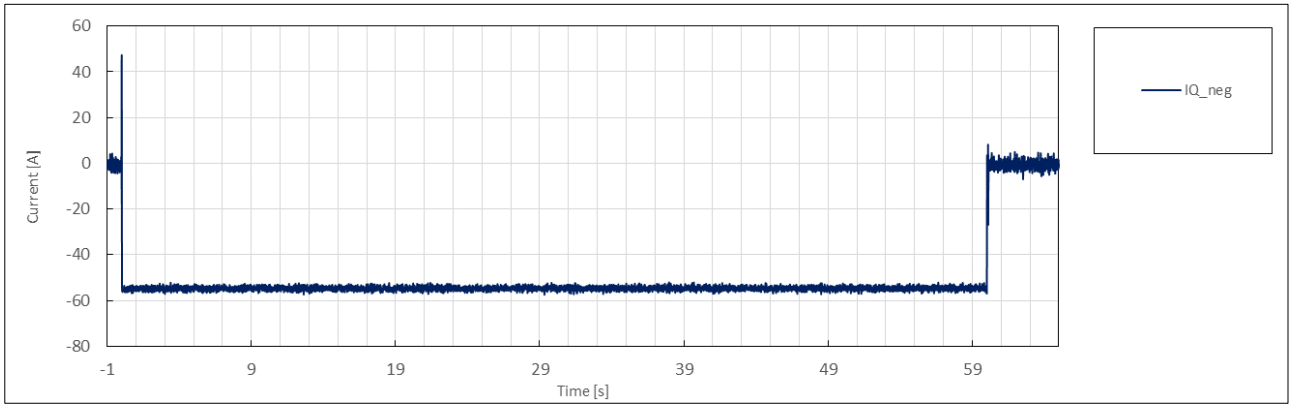

400
350
300
250
200
150
100
50
0
Current [A]
-1
9
19
29
39
49
59
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

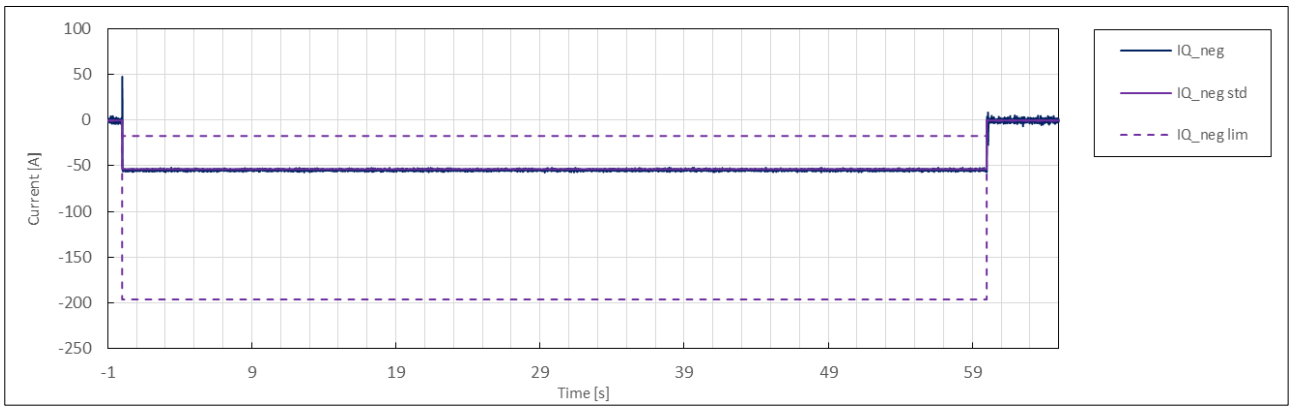

400
350
300
250
200
150
100
50
0
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IP_pos


400
350
300
250
200
150
100
50
0
-50
Current [A]
-1
9
19
29
39
49
59
Time [s]
IP_pos
IP_posstd

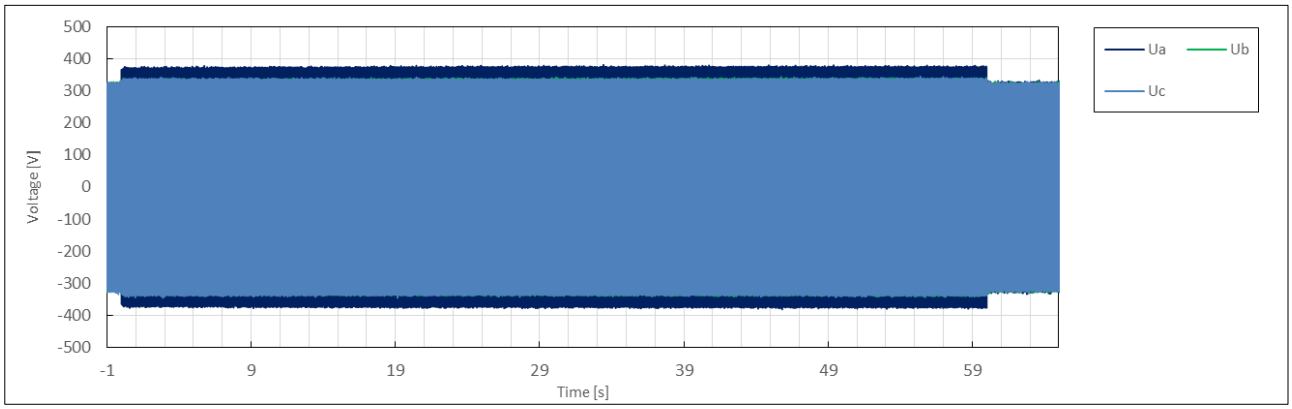

40
20
0
-20
-40
-60
-80
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos

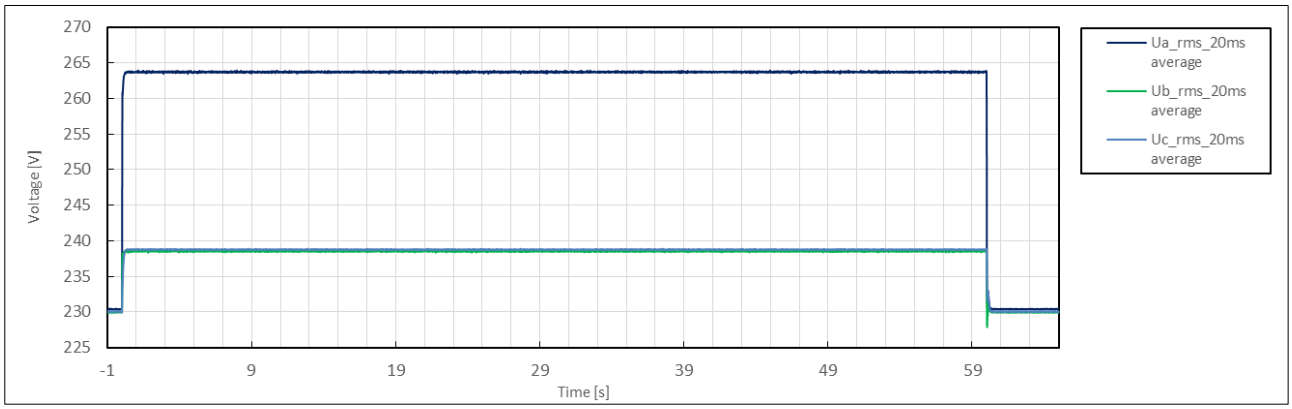

50
0
-50
-100
-150
-200
-250
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

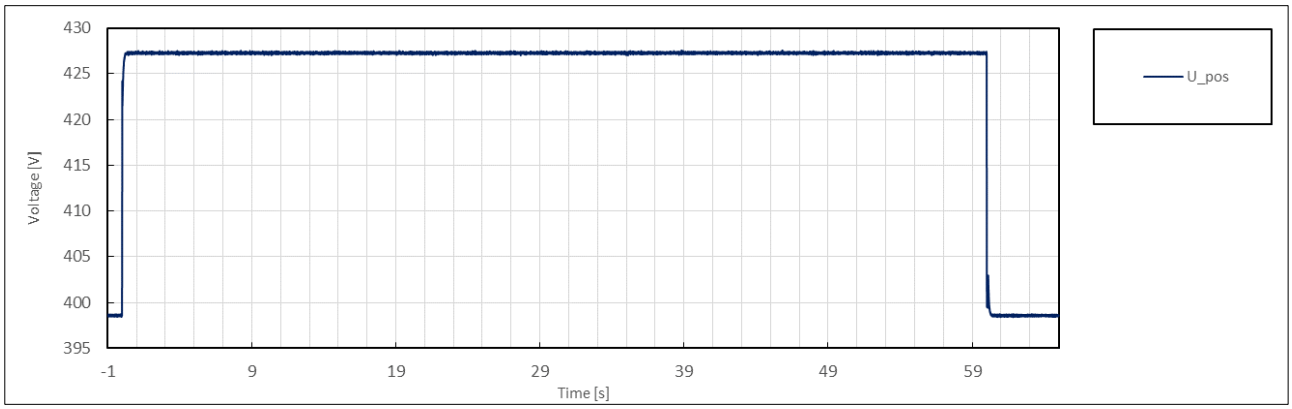

60
40
20
0
-20
-40
-60
-80
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg


100
50
0
-50
-100
-150
-200
-250
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim

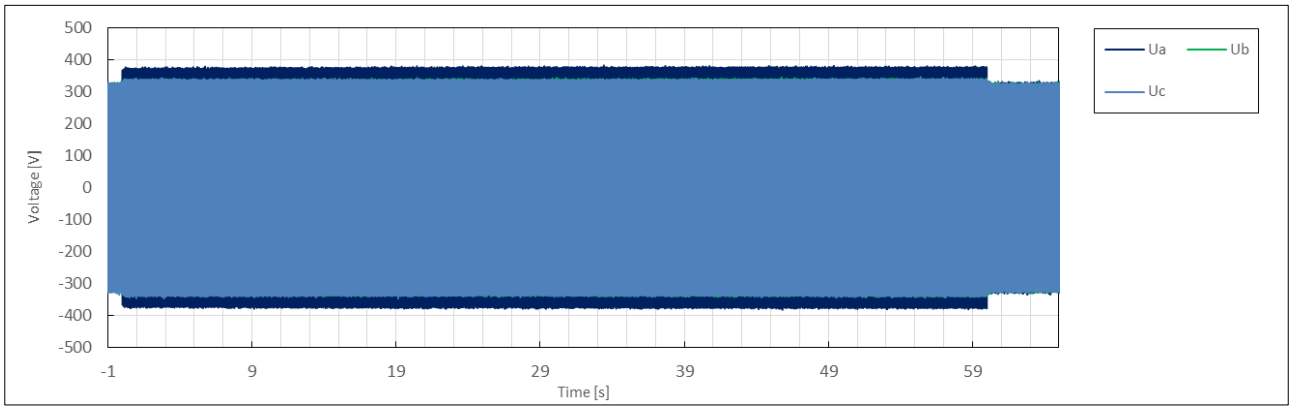
No. 6.4 Idle Test

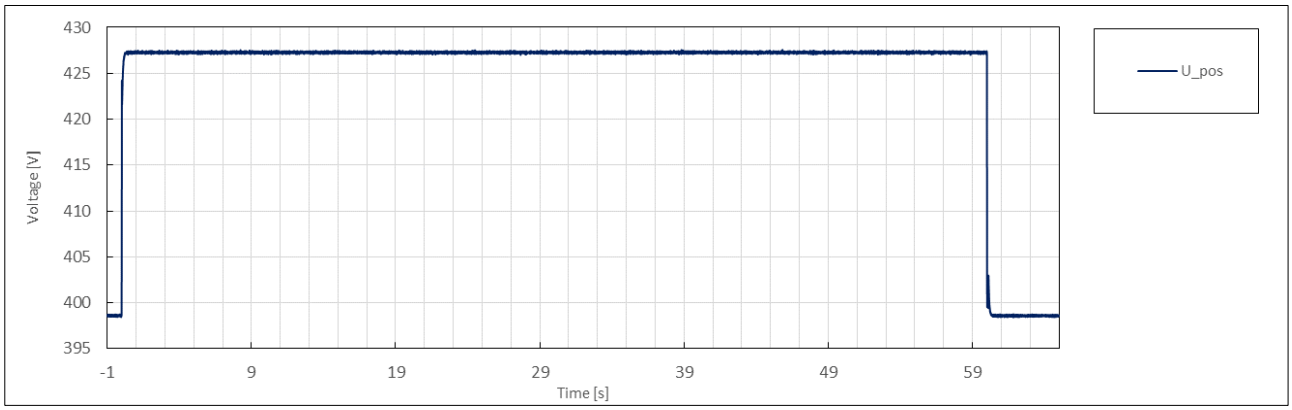


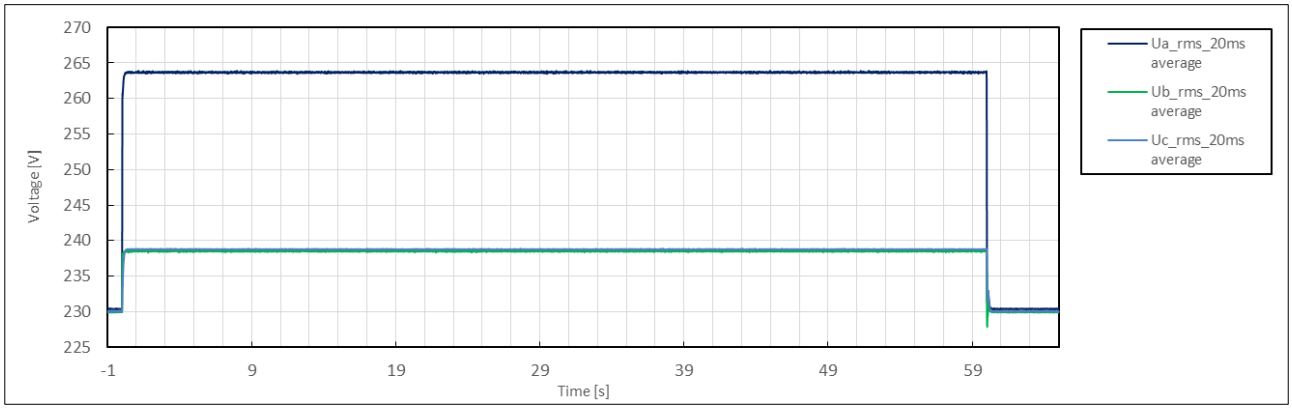


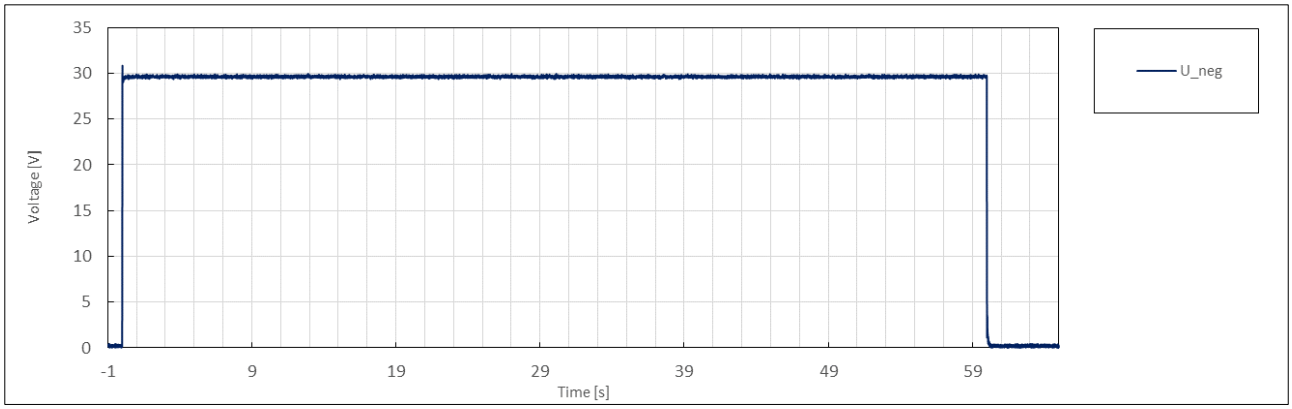


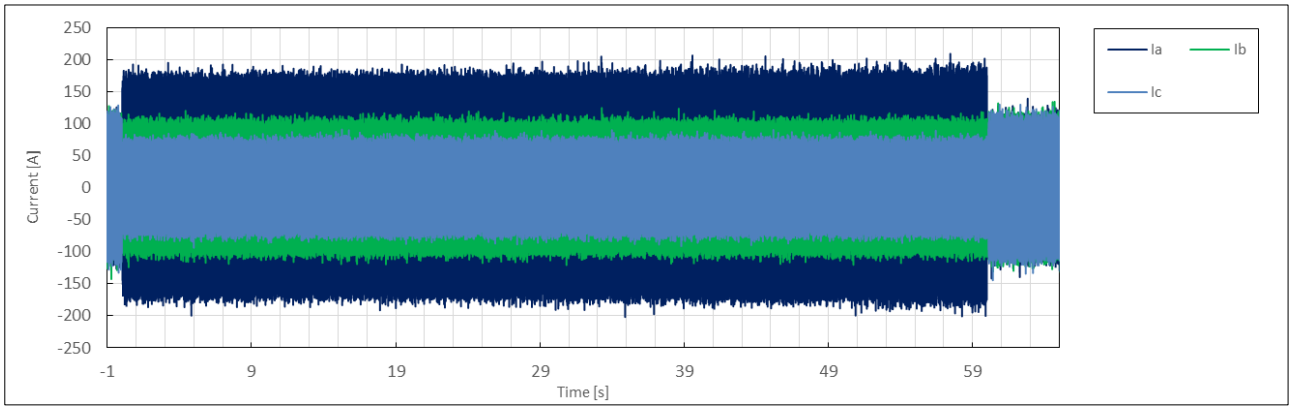
No. 6.4 Load Test

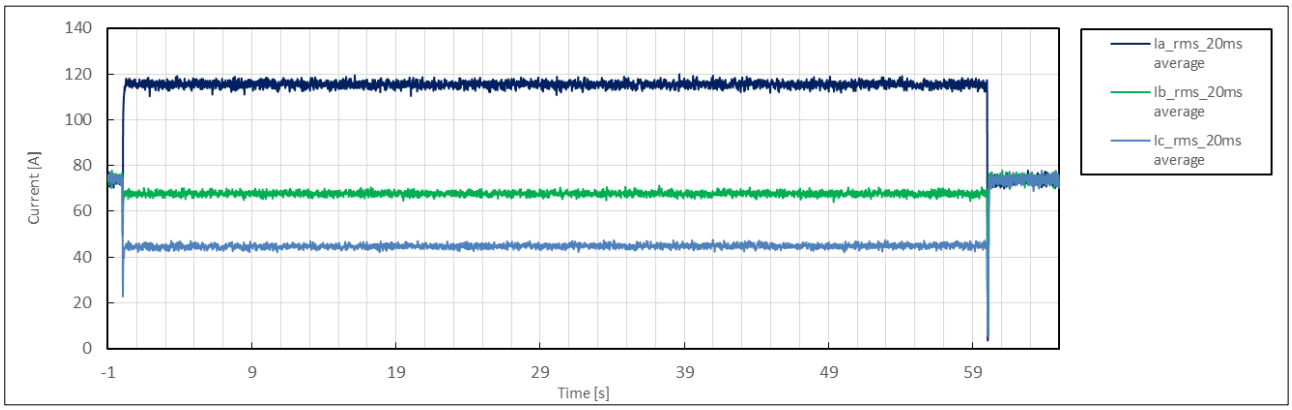


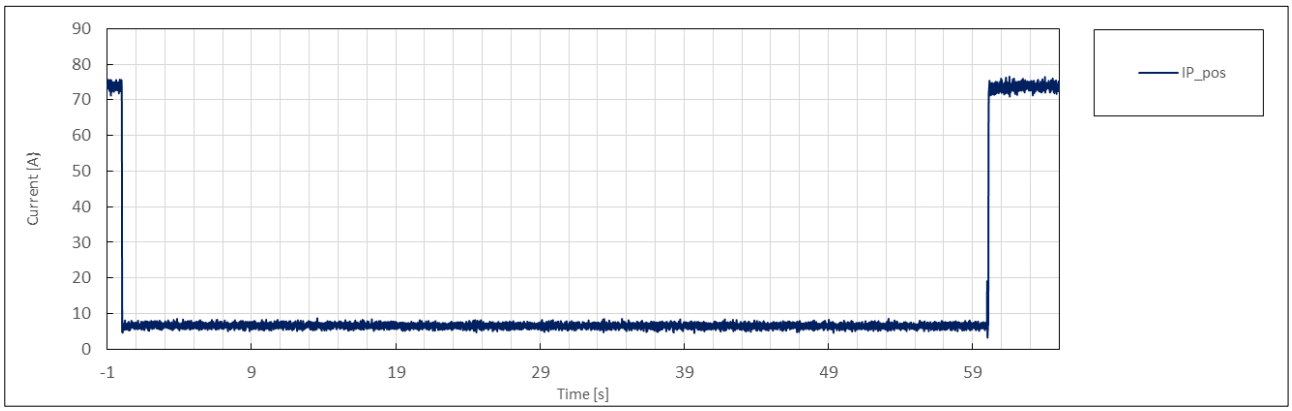


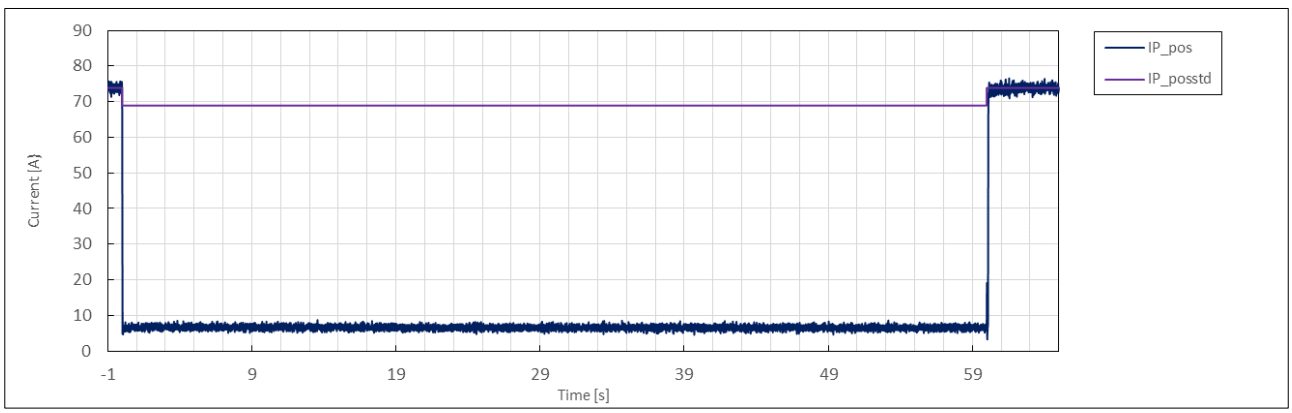


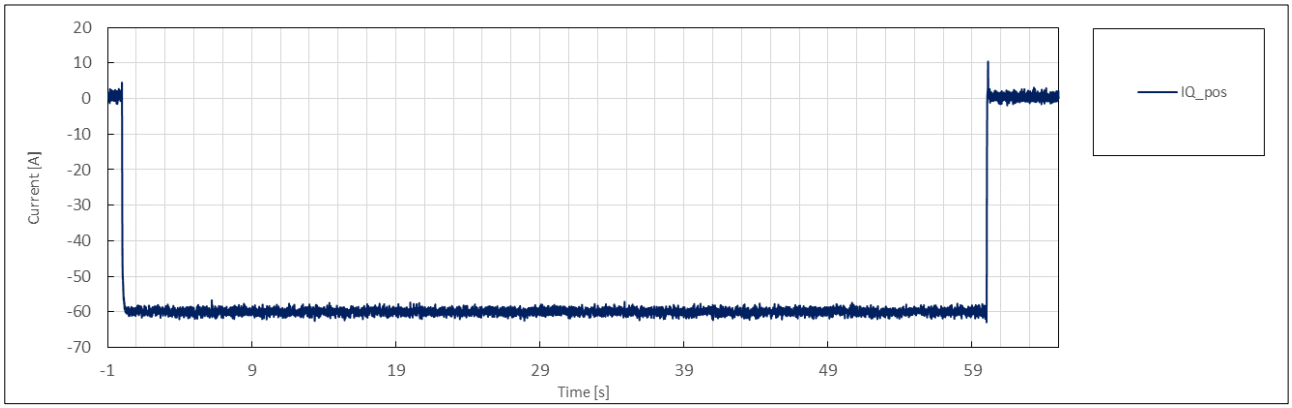


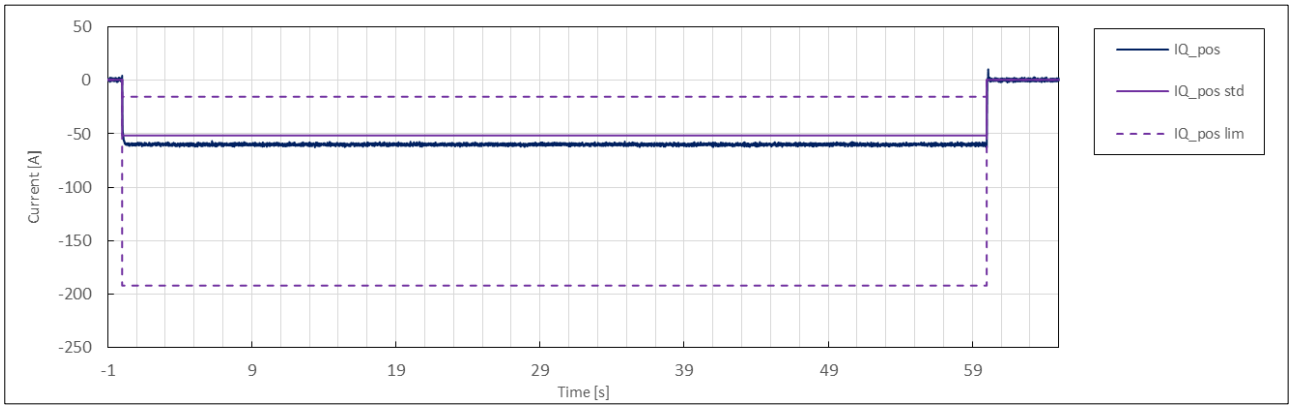

Current [A]
Time [s]
Ia
Ib
Ic

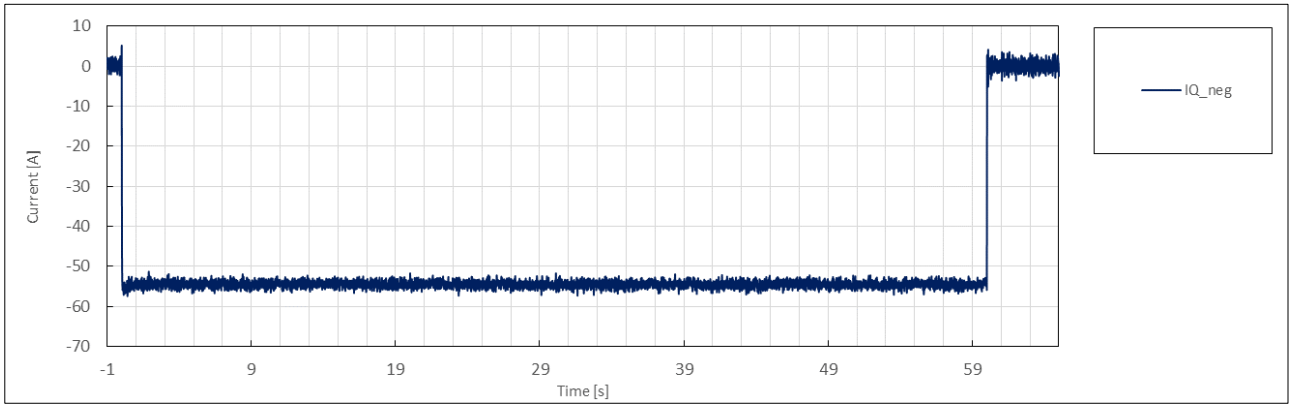

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

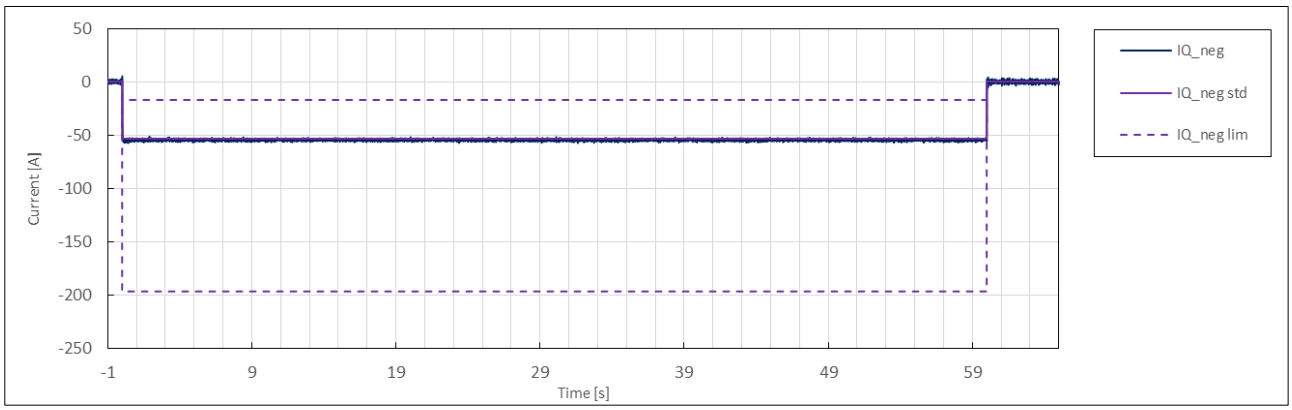

Current [A]
Time [s]
IP_pos


Current [A]
Time [s]
IP_pos
IP_posstd

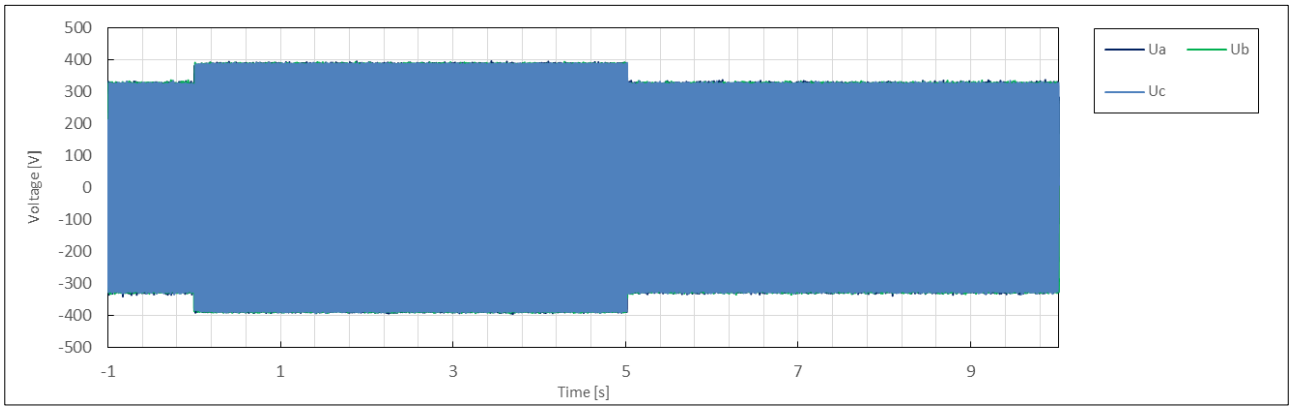

20
10
0
-10
-20
-30
-40
-50
-60
-70
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos

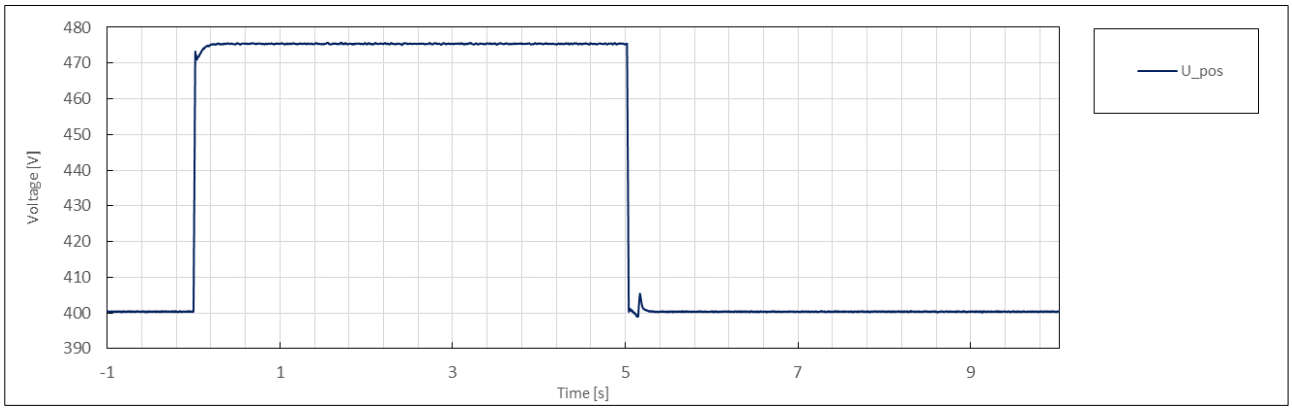

50
0
-50
-100
-150
-200
-250
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

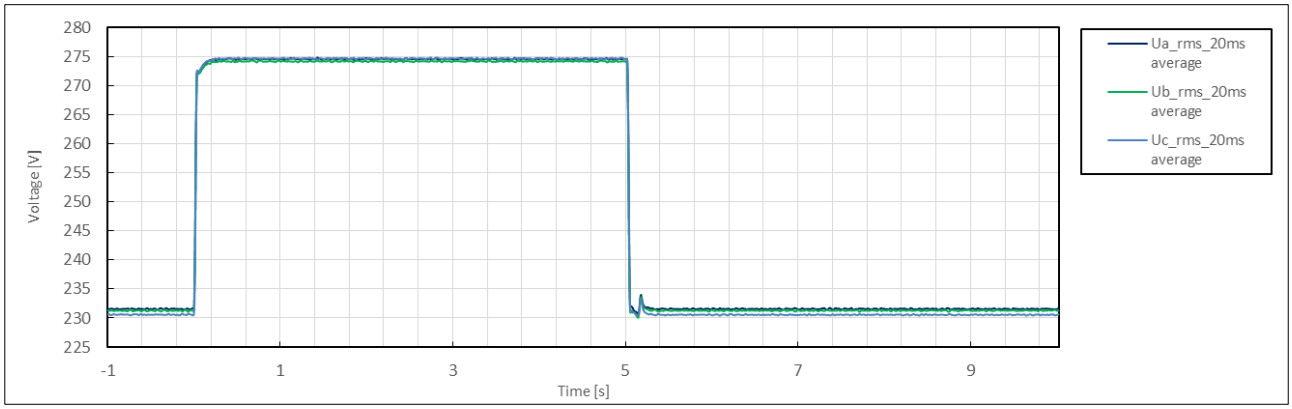

10
0
-10
-20
-30
-40
-50
-60
-70
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg


50
0
-50
-100
-150
-200
-250
Current [A]
-1
9
19
29
39
49
59
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim

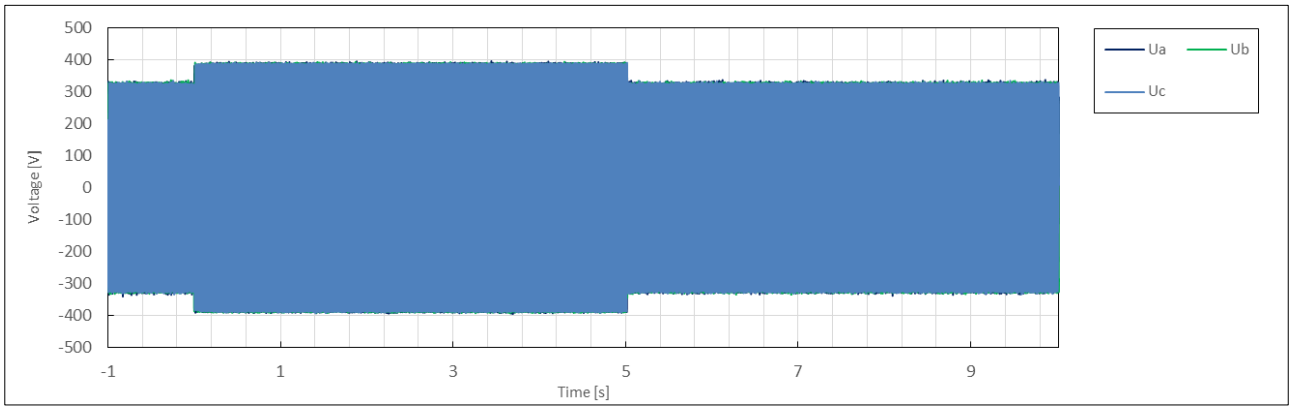
No. 7.1 Idle Test

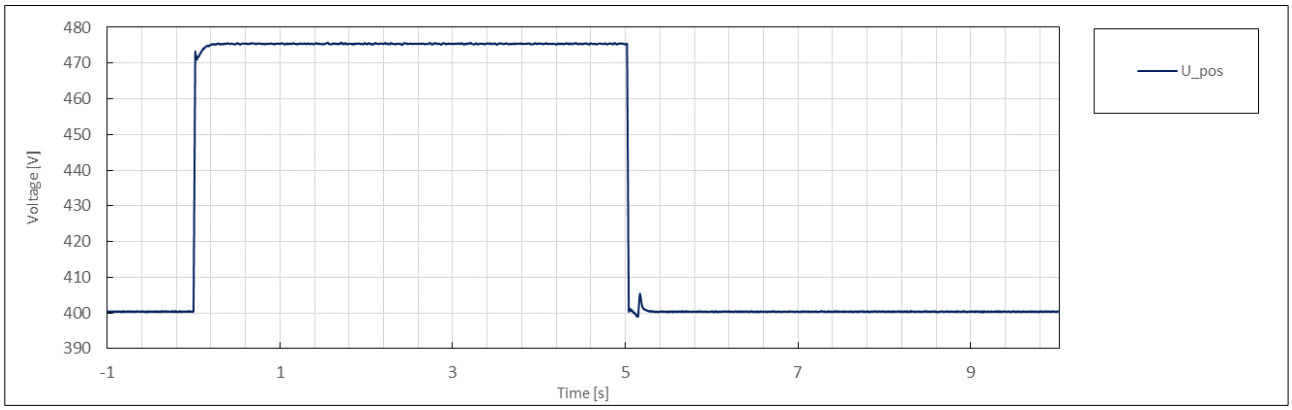


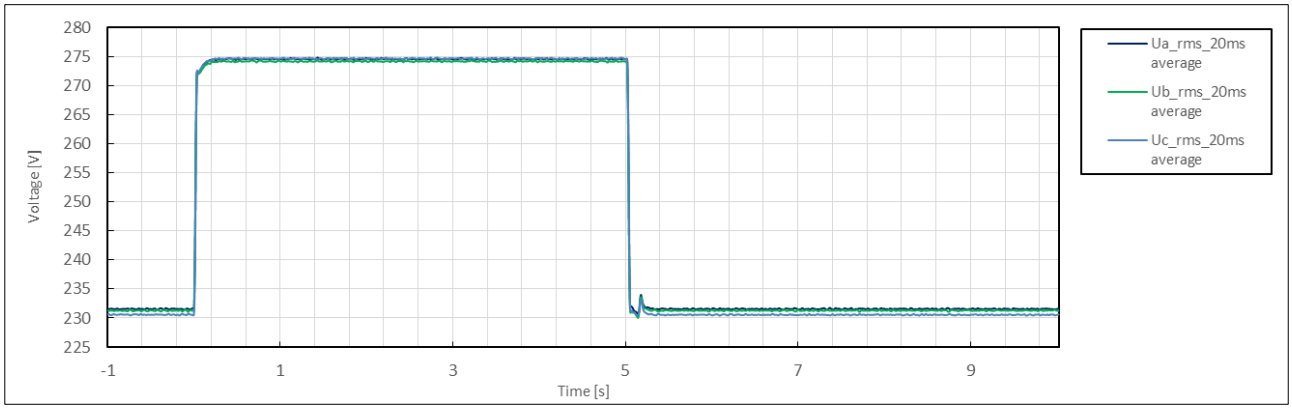


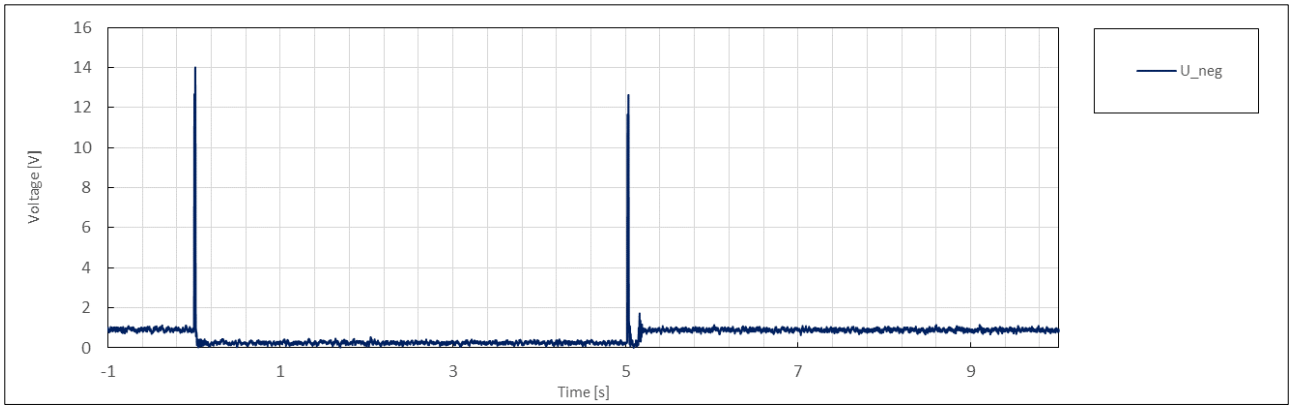


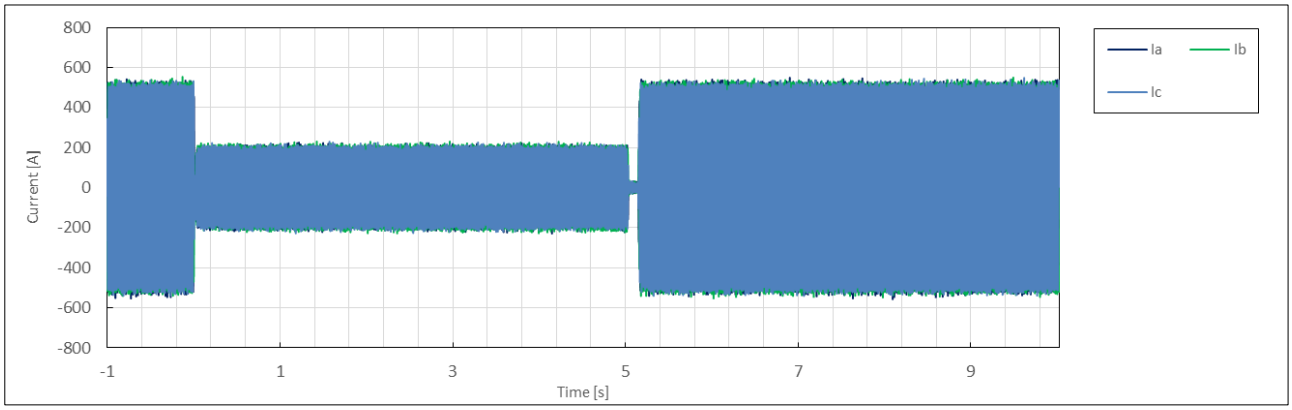
No. 7.1 Load Test

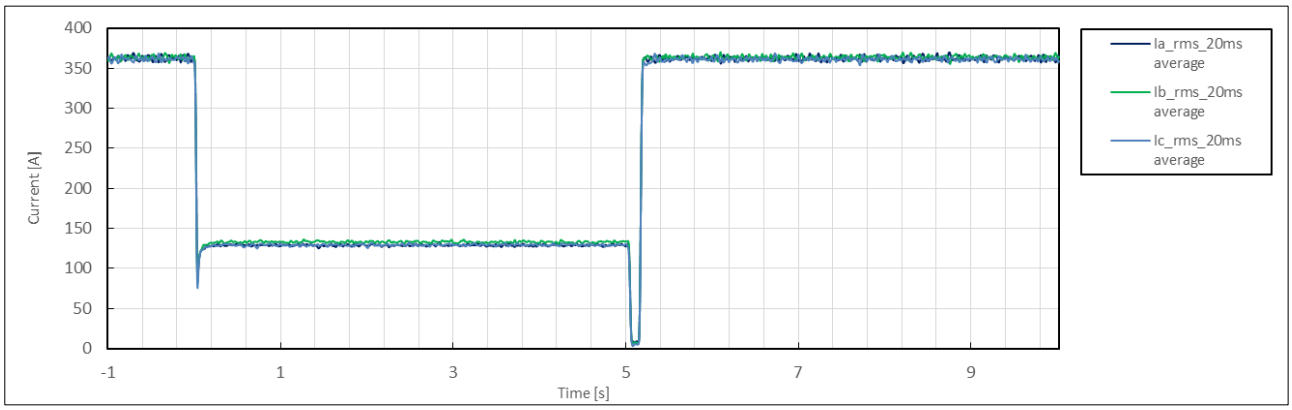


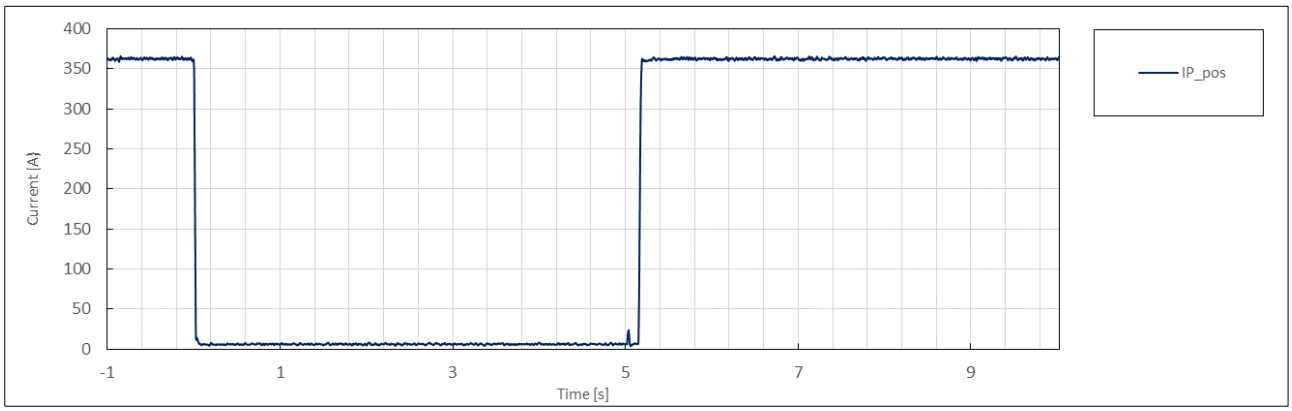


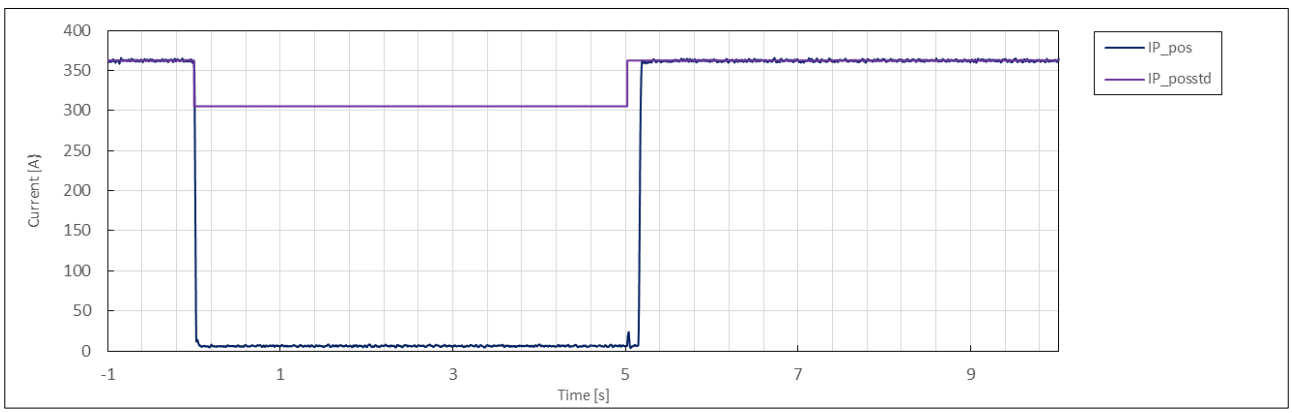


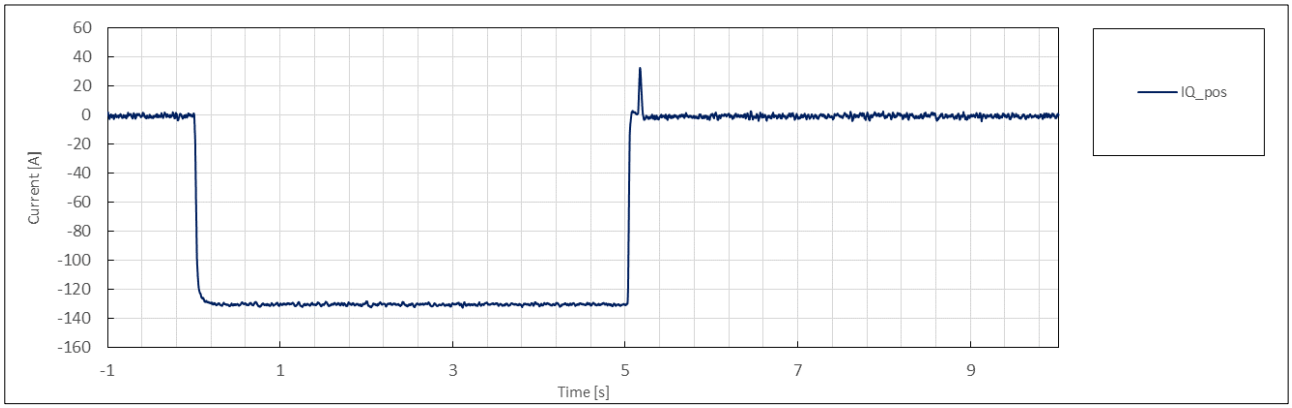


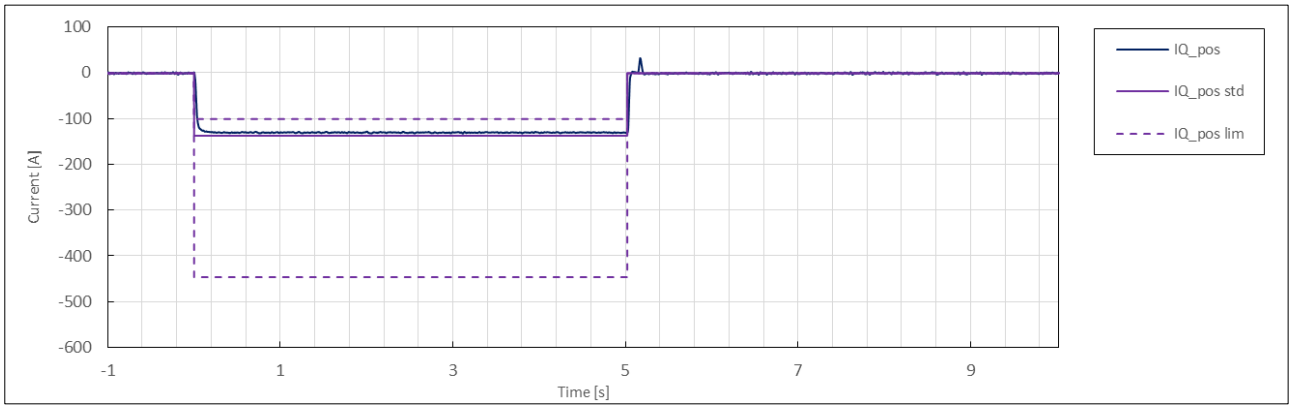

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
1
3
5
7
9
Time [s]
Ia
Ib
Ic

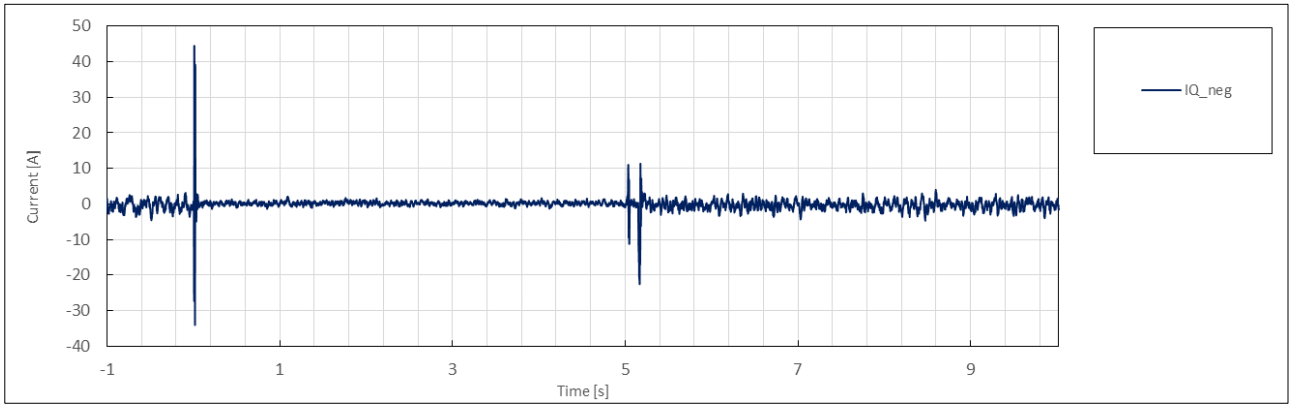

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

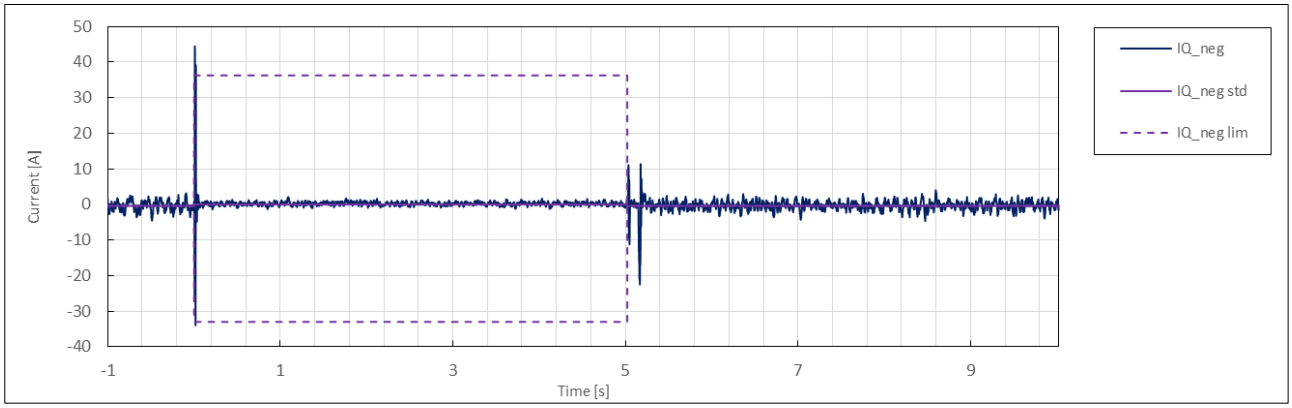

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
IP_pos

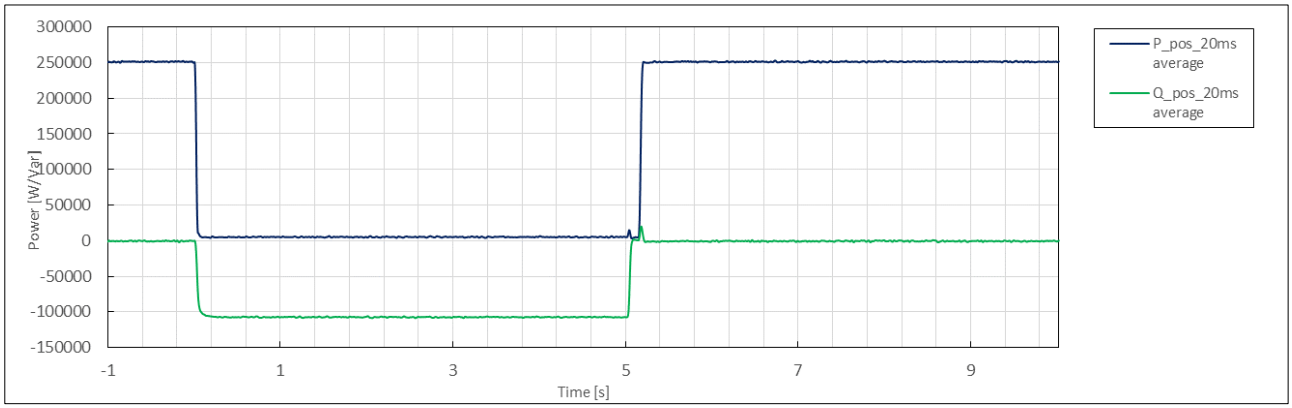

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
IP_pos
IP_posstd


60
40
20
0
-20
-40
-60
-80
-100
-120
-140
-160
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_pos

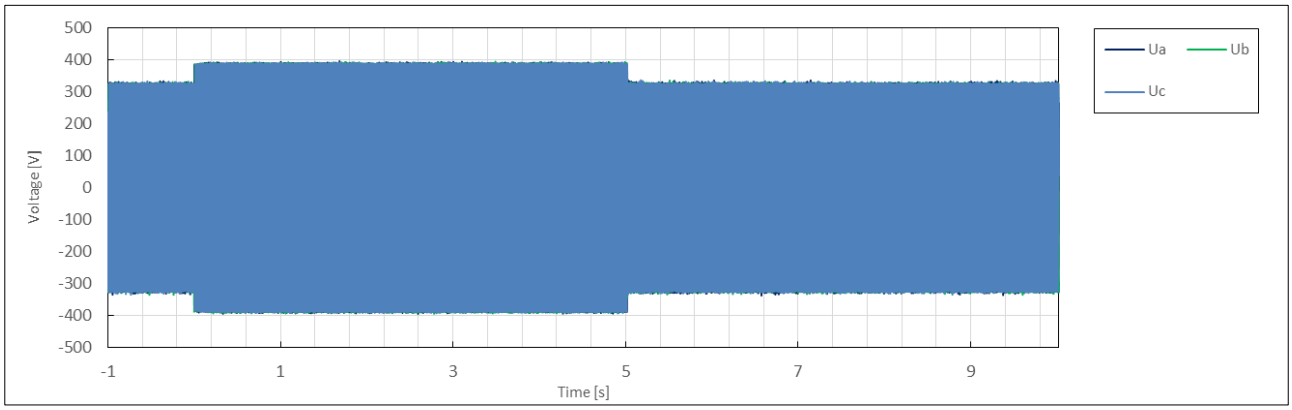

100
0
-100
-200
-300
-400
-500
-600
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

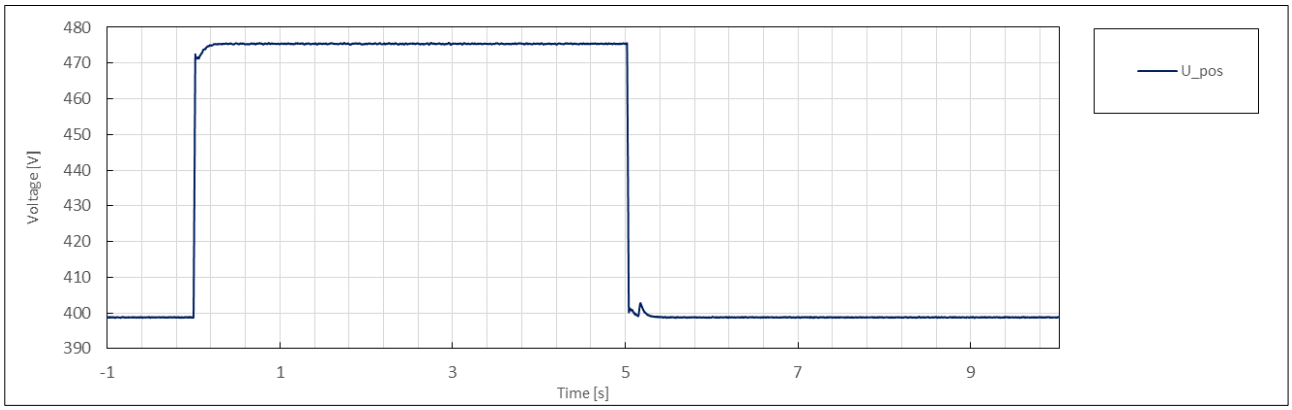

50
40
30
20
10
0
-10
-20
-30
-40
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_neg

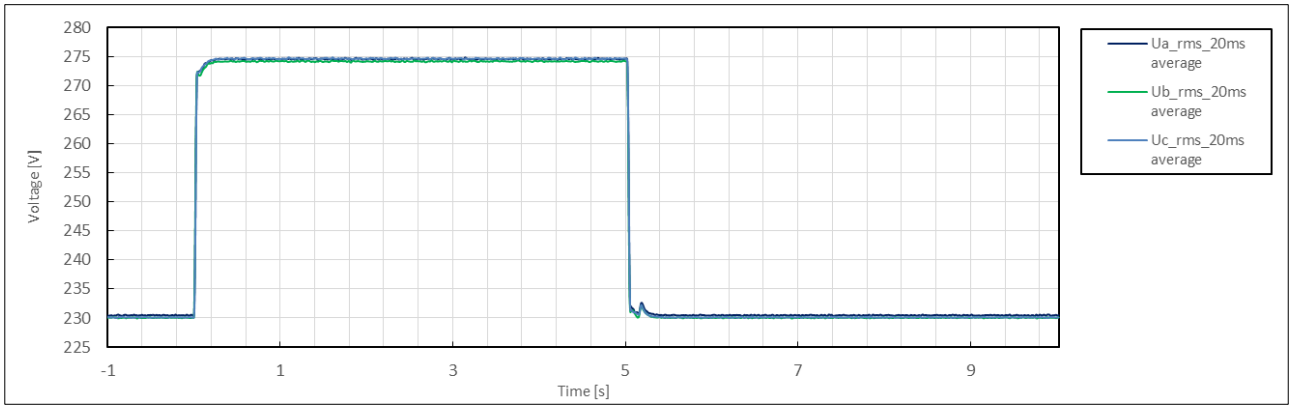

50
40
30
20
10
0
-10
-20
-30
-40
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
-150000
Power [W/Var]
-1
1
3
5
7
9
Time [s]
P_pos_20ms average
Q_pos_20ms average

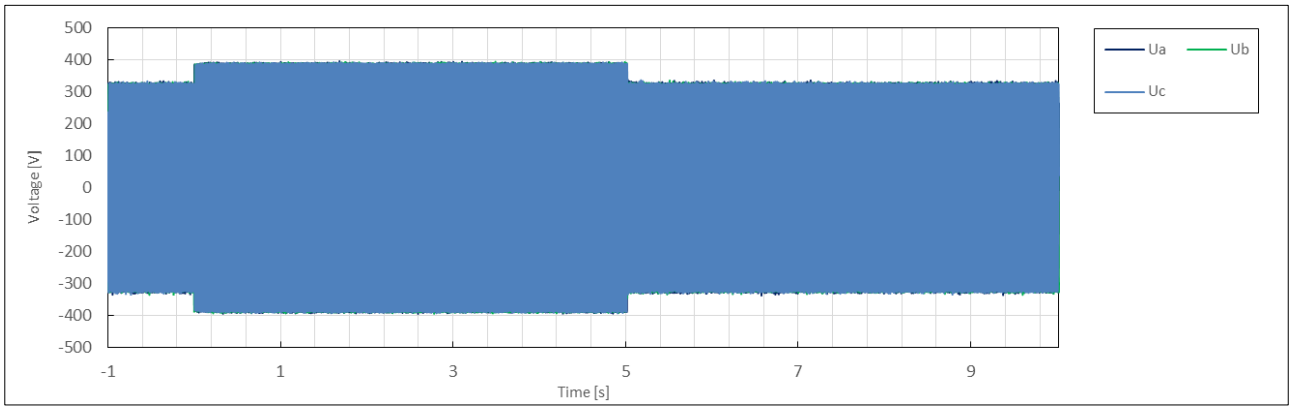
No. 7.2 Idle Test

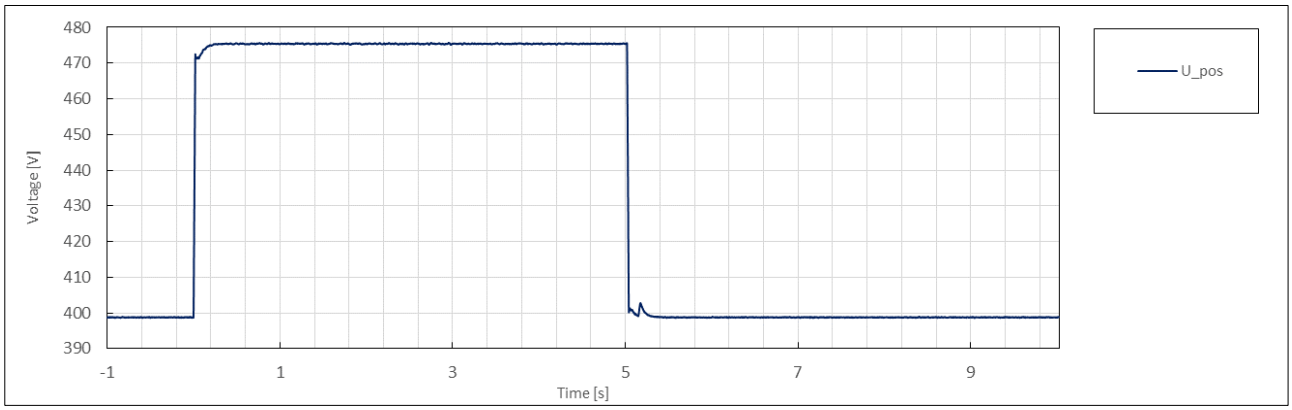


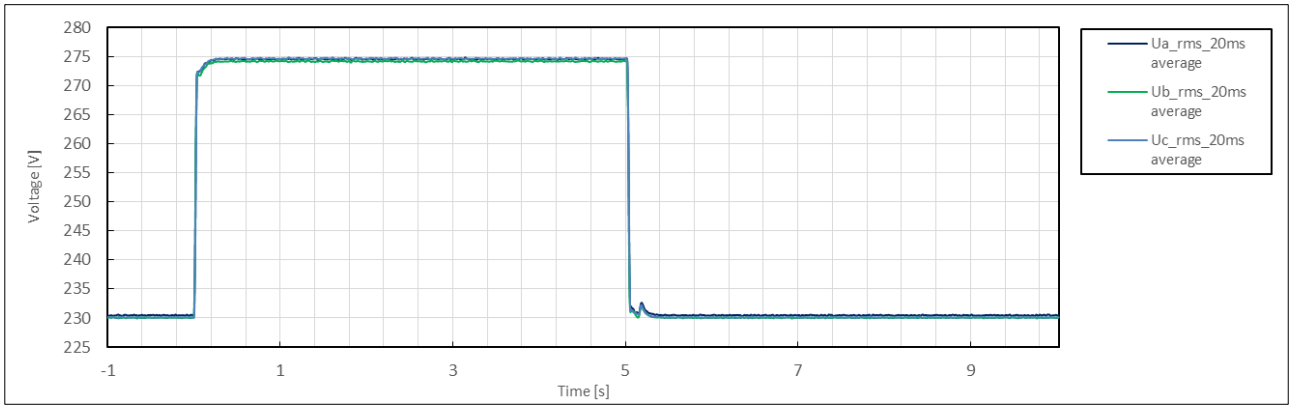


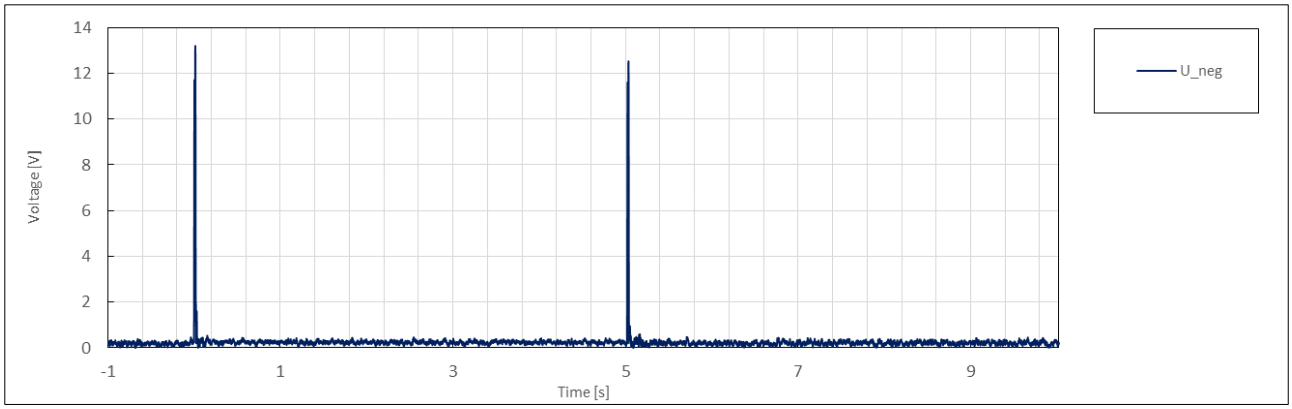


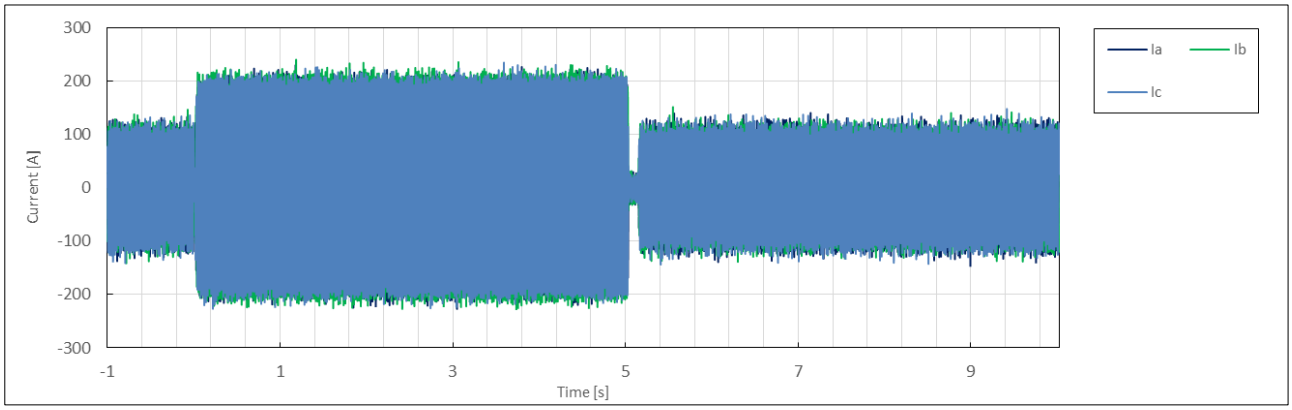
No. 7.2 Load Test

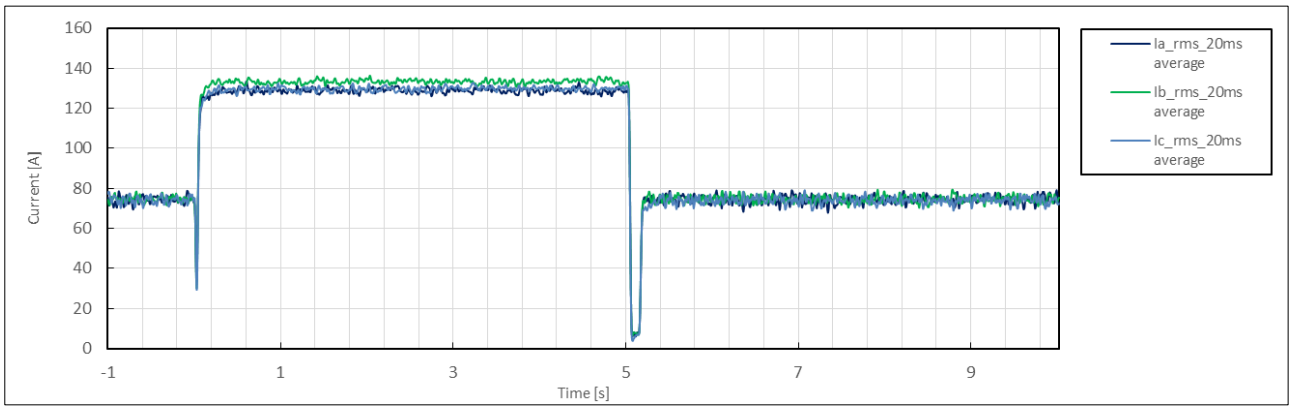


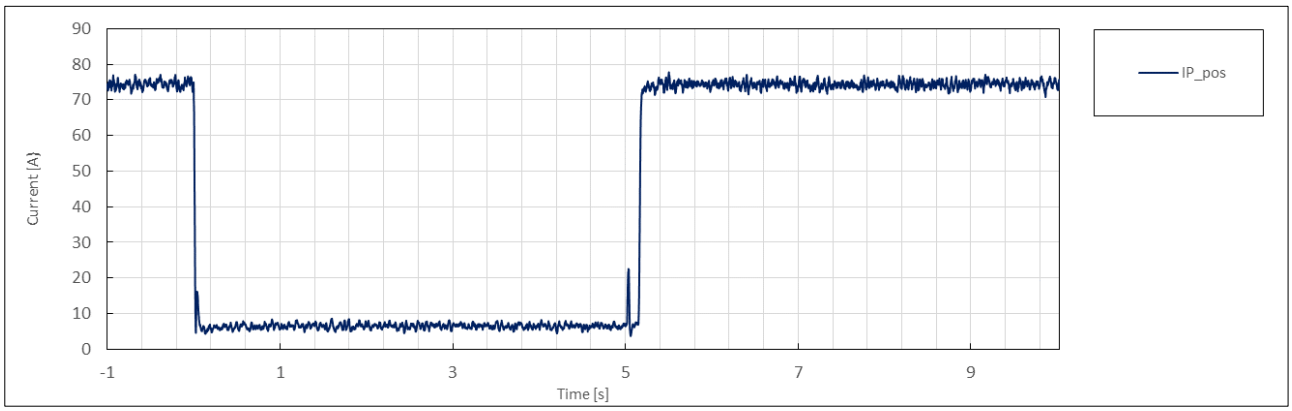


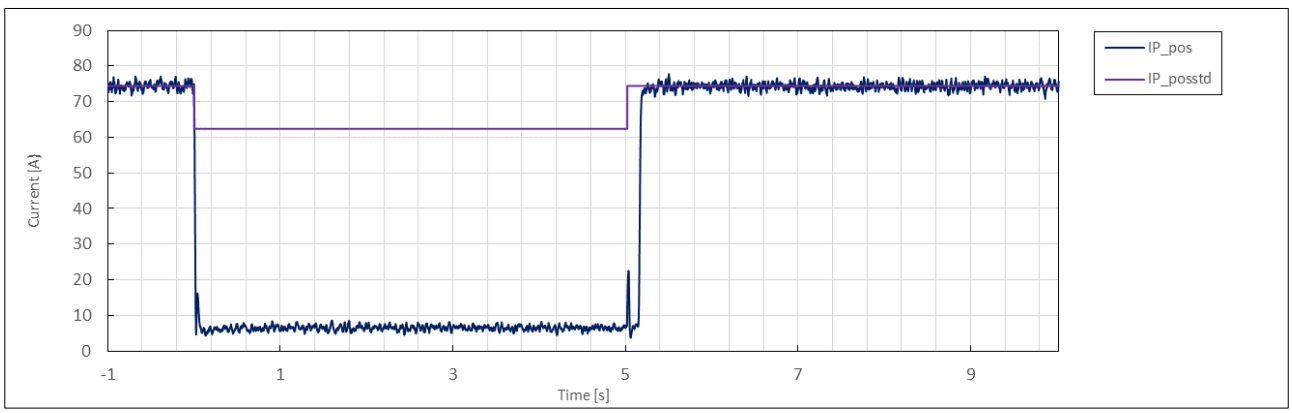


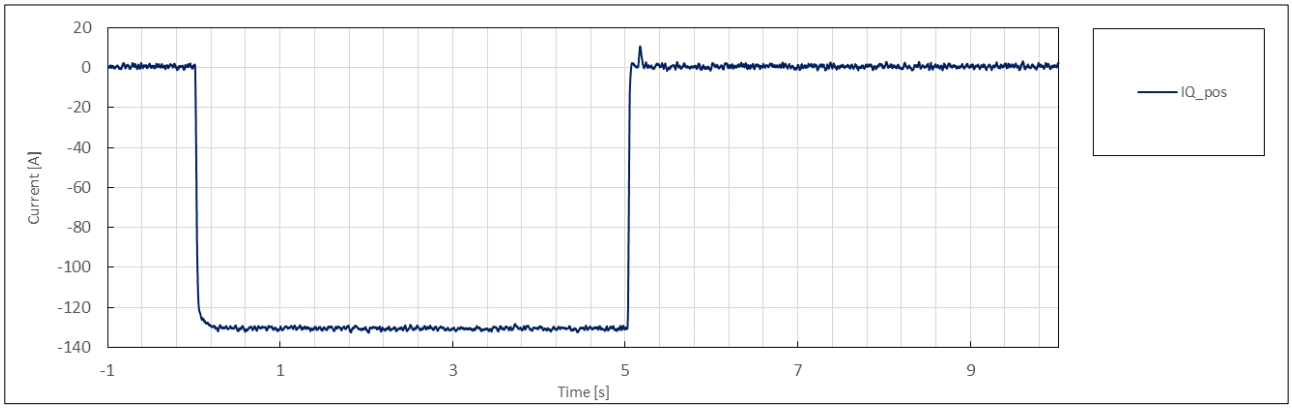


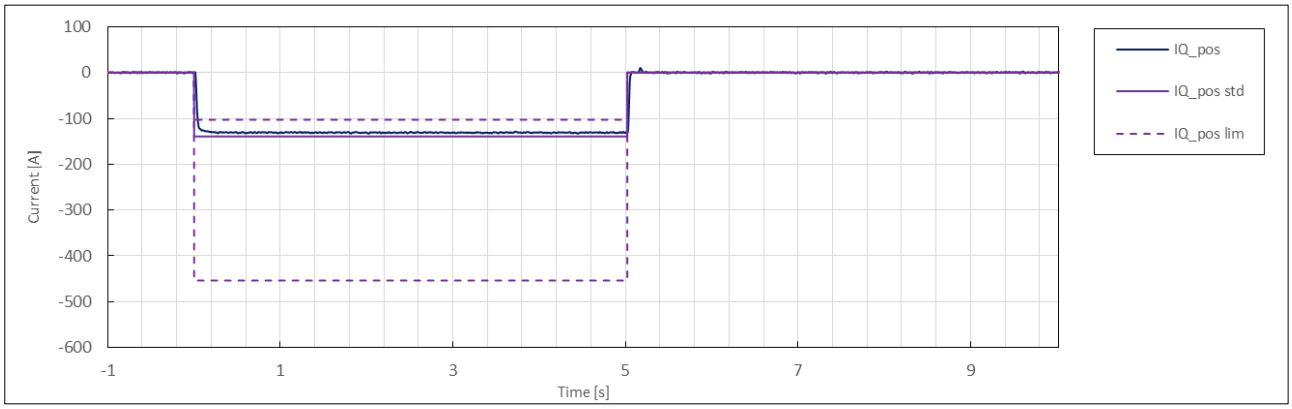

Current [A]
Time [s]
Ia
Ib
Ic

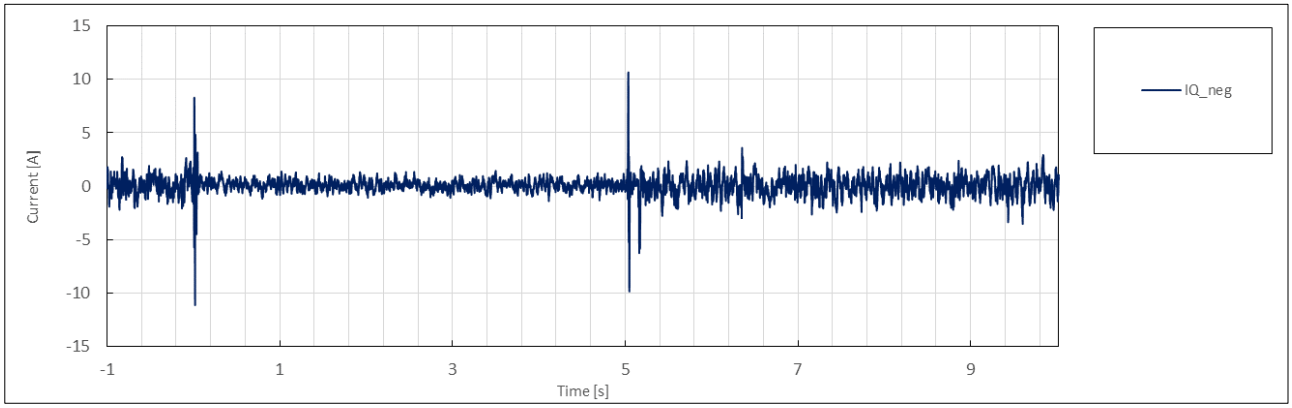

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

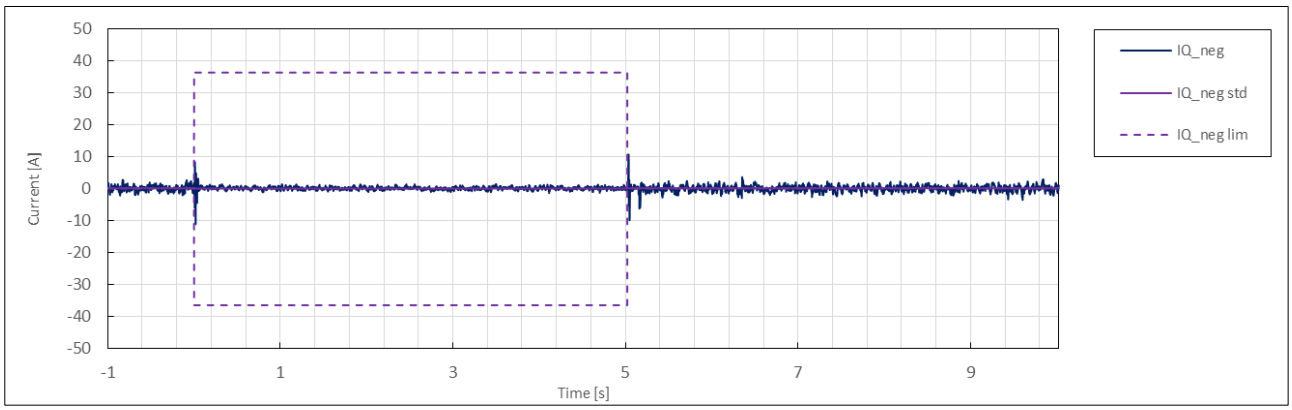

Current [A]
Time [s]
IP_pos

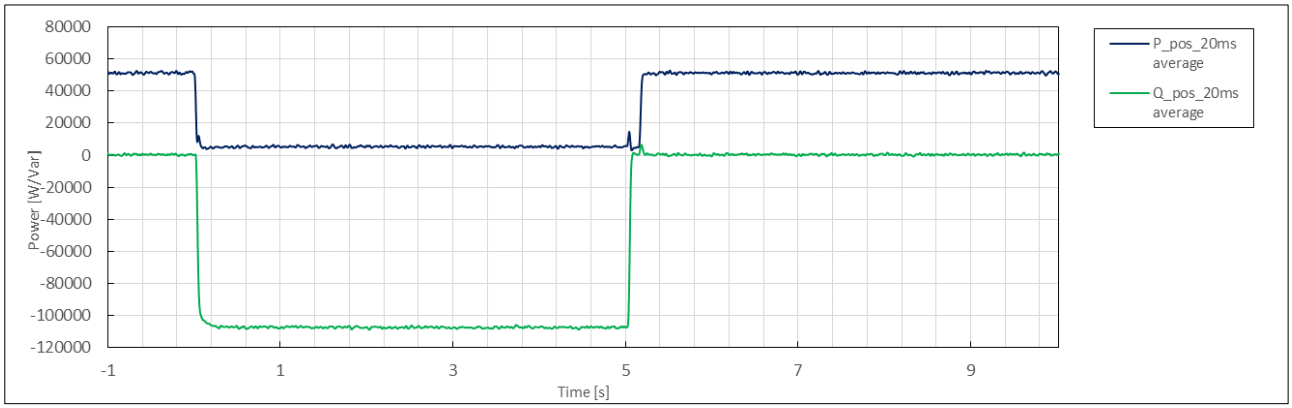

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

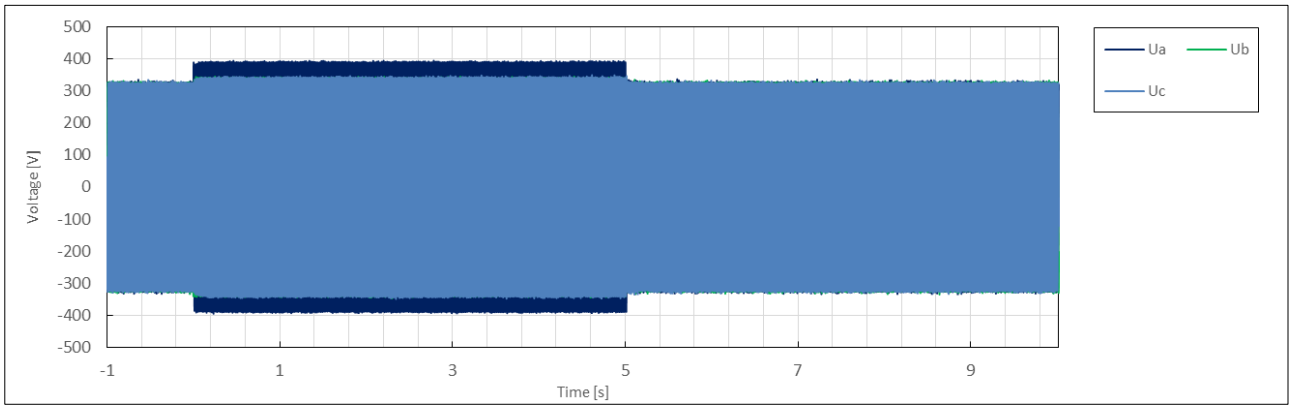

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

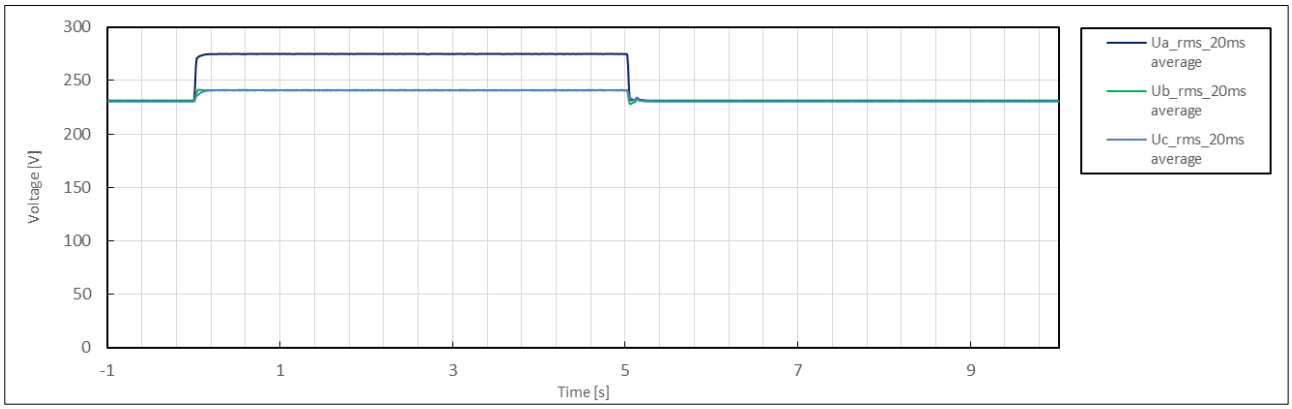

Current [A]
Time [s]
IQ_neg

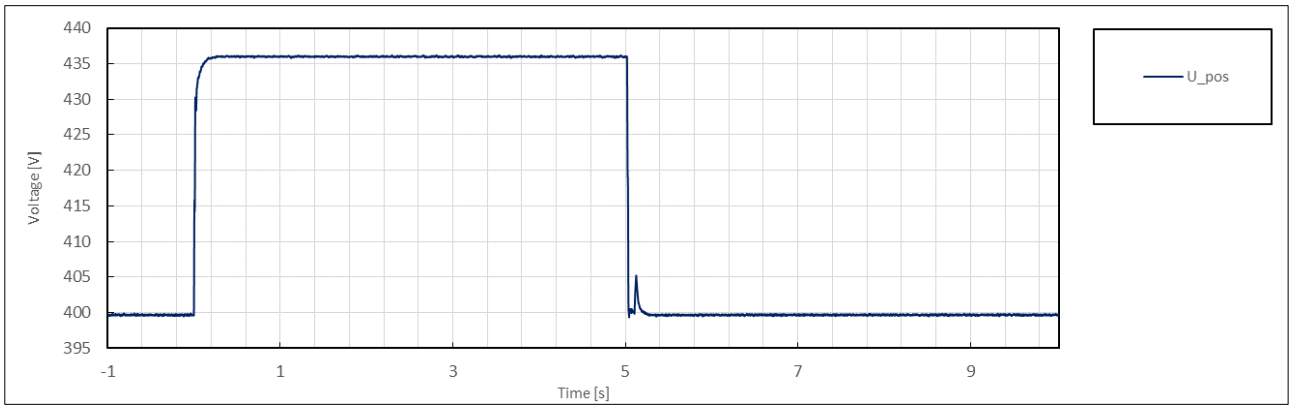

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


80000
60000
40000
20000
0
-20000
-40000
-60000
-80000
-100000
-120000
Power [W/Var]
-1
1
3
5
7
9
Time [s]
P_pos_20ms average
Q_pos_20ms average

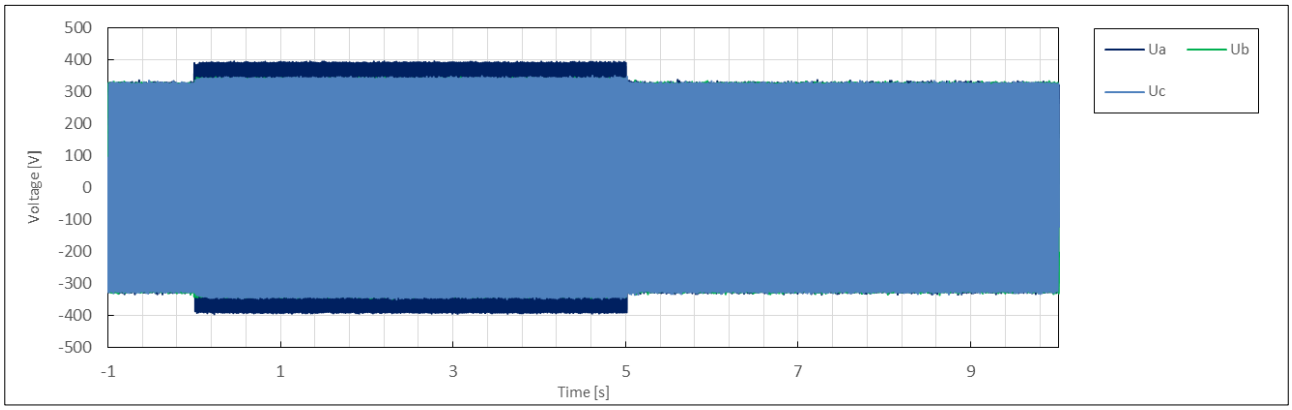
No. 7.3 Idle Test

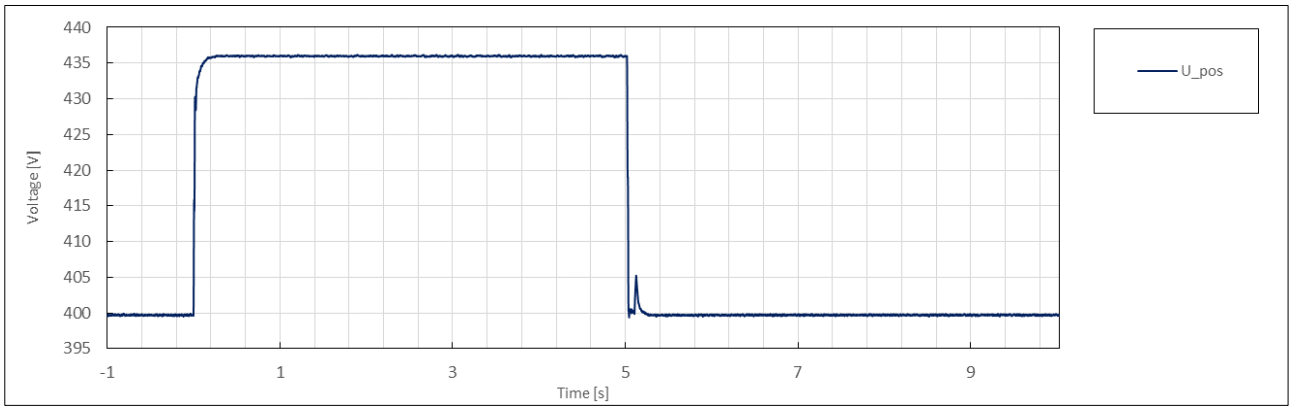


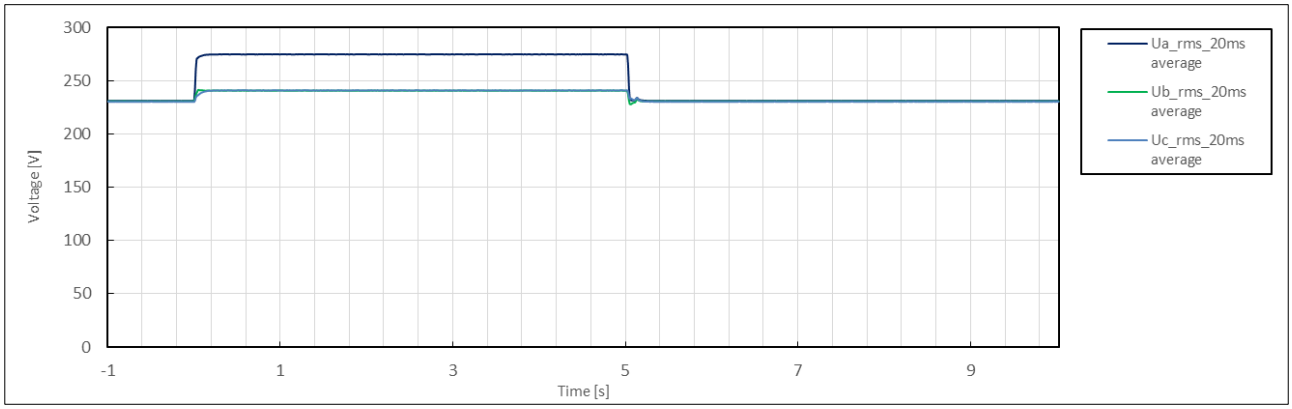


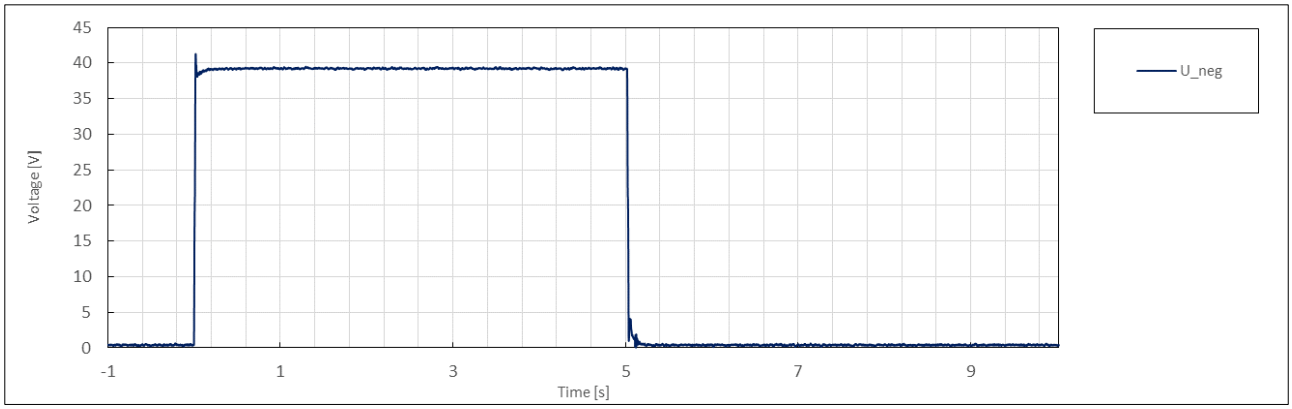


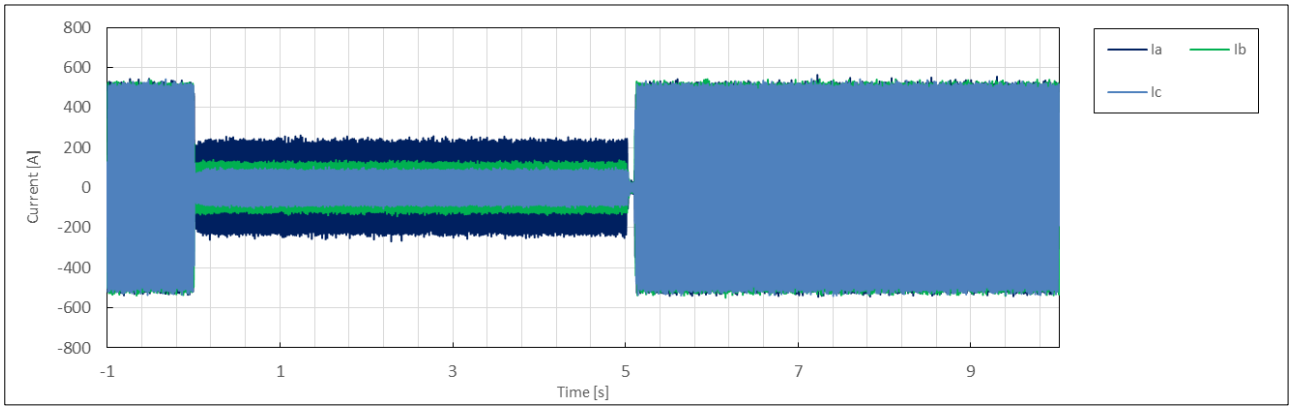
No. 7.3 Load Test

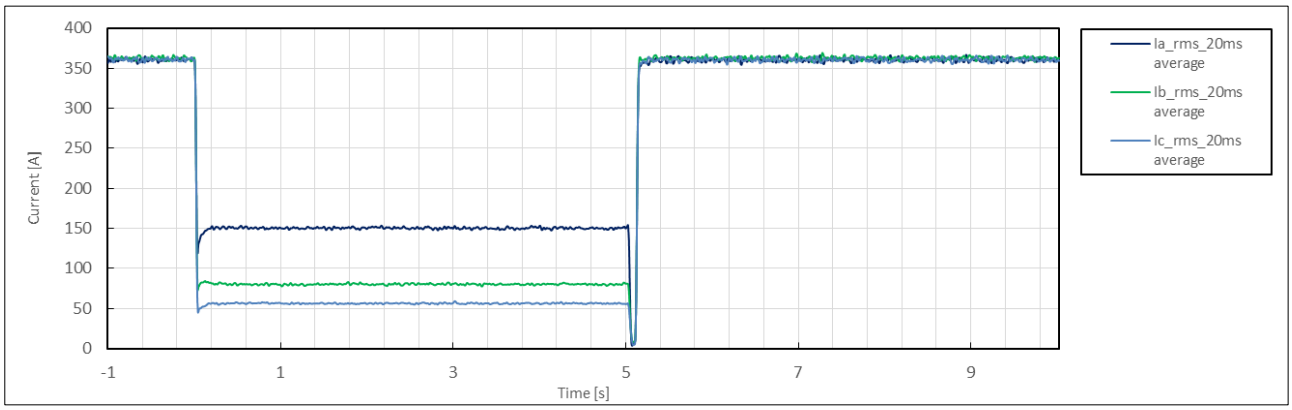


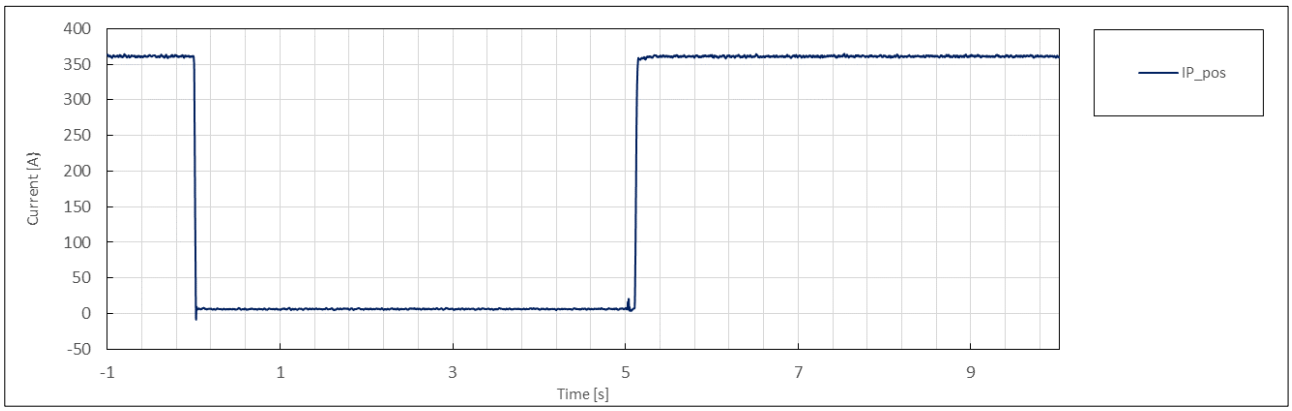


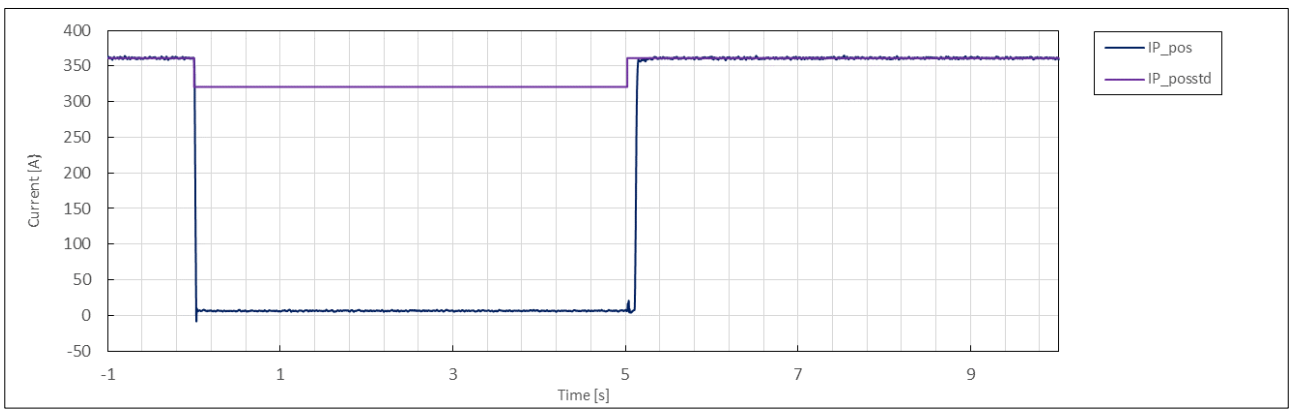


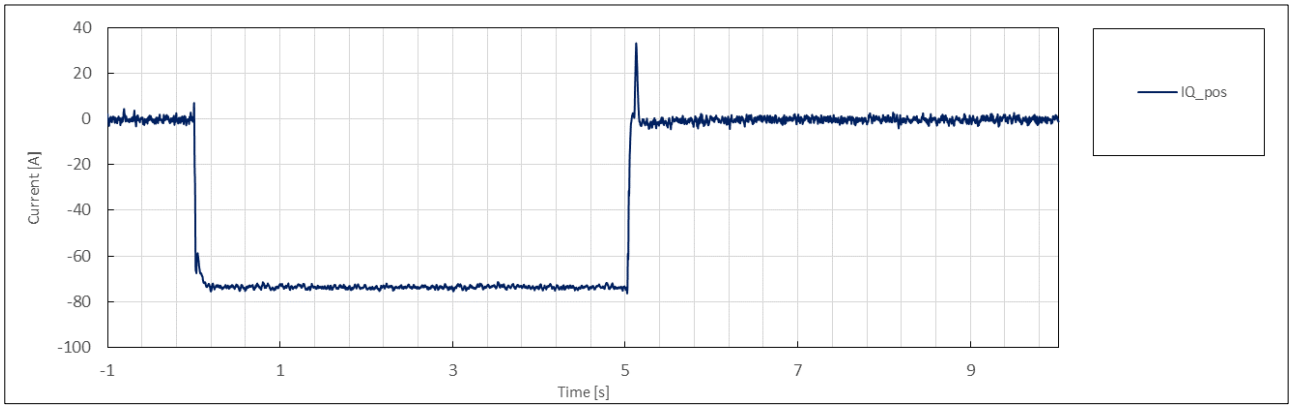


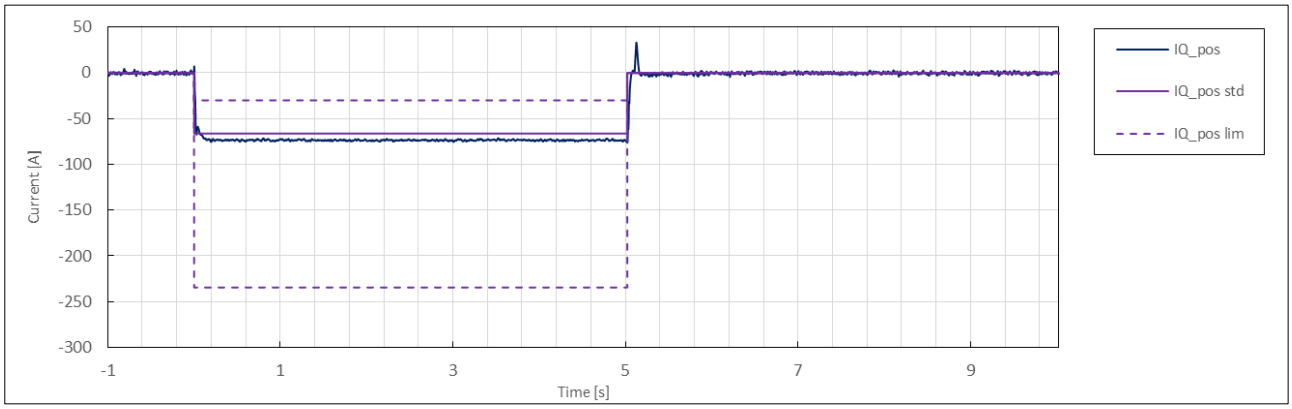

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
1
3
5
7
9
Time [s]
Ia
Ib
Ic

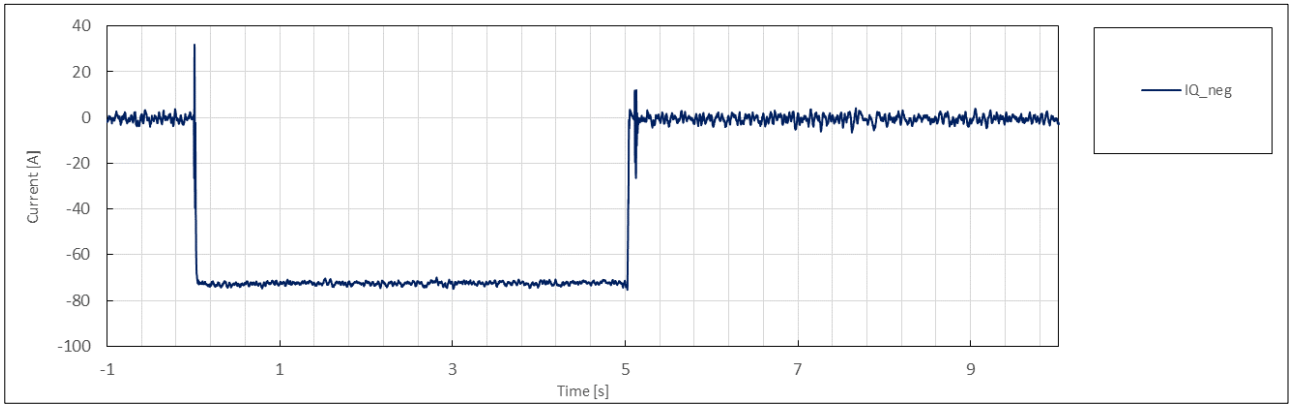

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

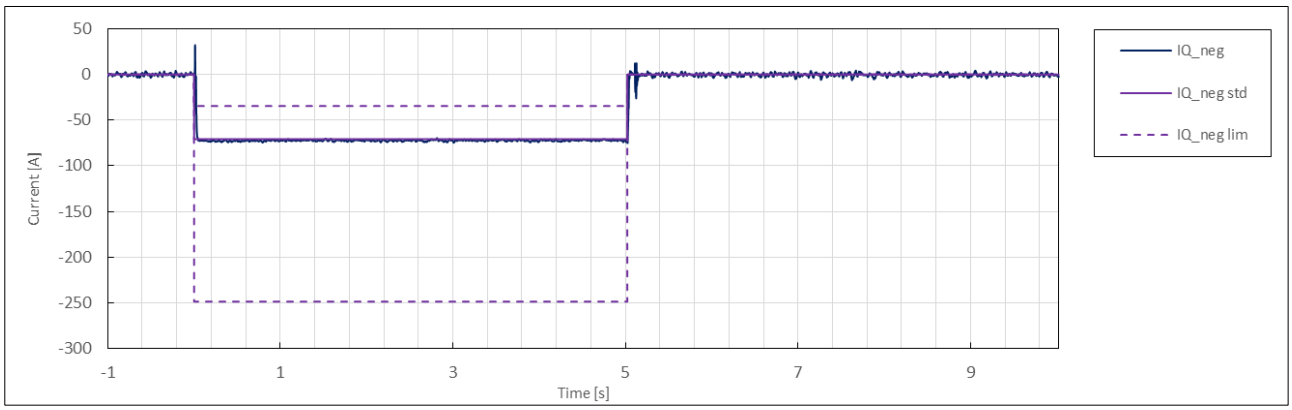

400
350
300
250
200
150
100
50
0
-50
Current [A]
-1
1
3
5
7
9
Time [s]
IP_pos

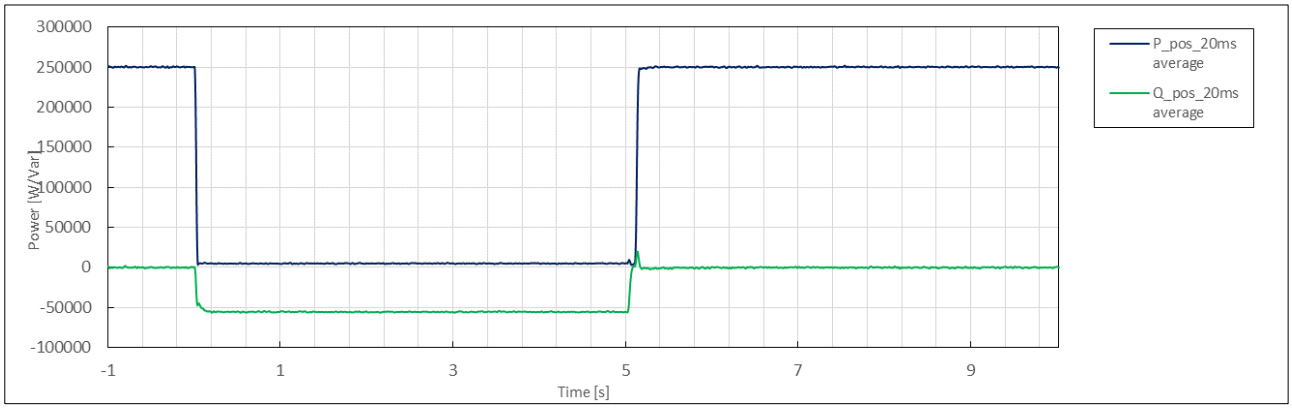

400
350
300
250
200
150
100
50
0
-50
Current [A]
-1
1
3
5
7
9
Time [s]
IP_pos
IP_posstd


40
20
0
-20
-40
-60
-80
-100
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_pos

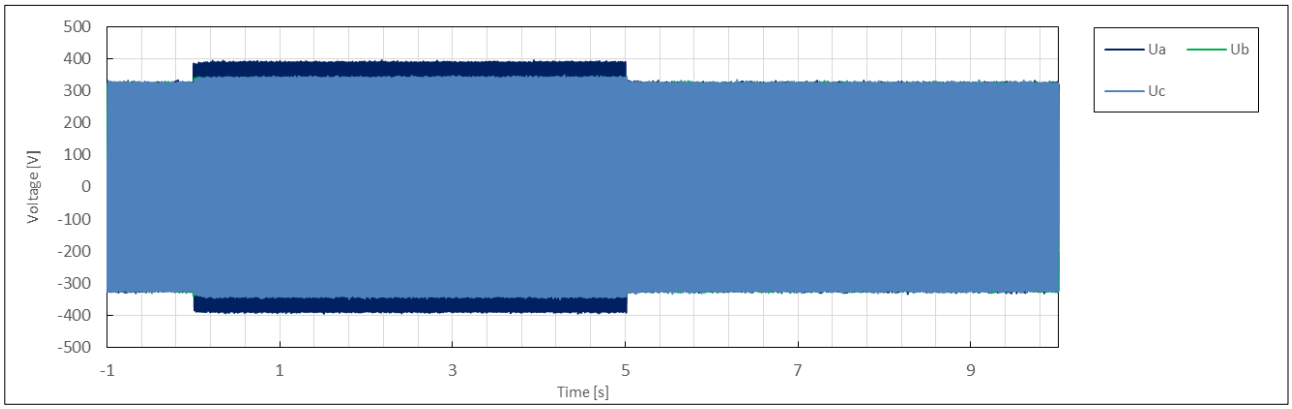

50
0
-50
-100
-150
-200
-250
-300
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

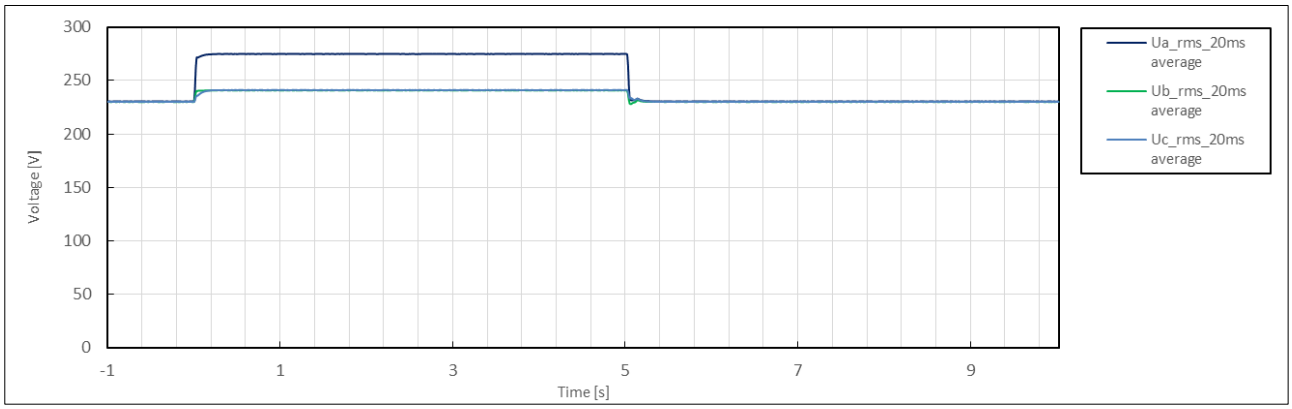

40
20
0
-20
-40
-60
-80
-100
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_neg

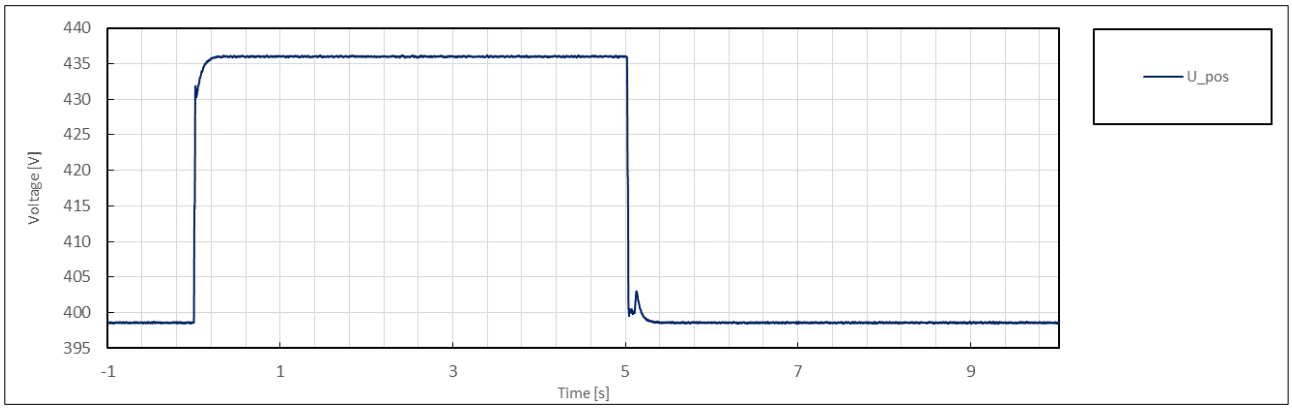

50
0
-50
-100
-150
-200
-250
-300
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
Power [W/Var]
-1
1
3
5
7
9
Time [s]
P_pos_20ms average
Q_pos_20ms average

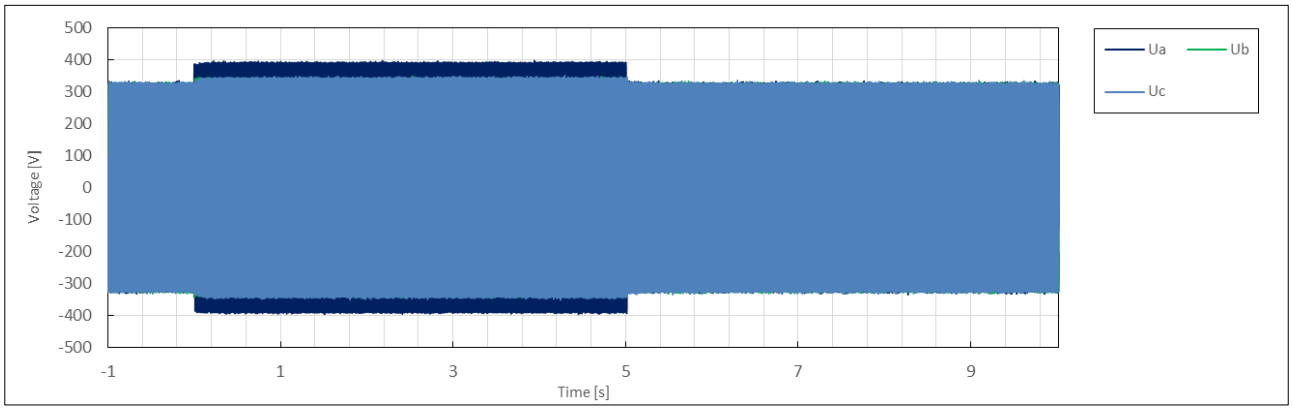
No. 7.4 Idle Test

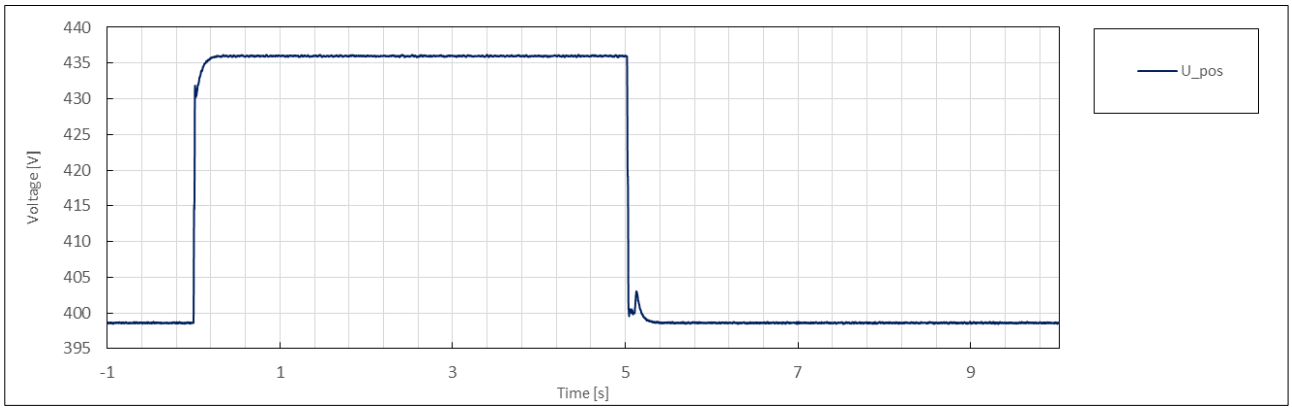


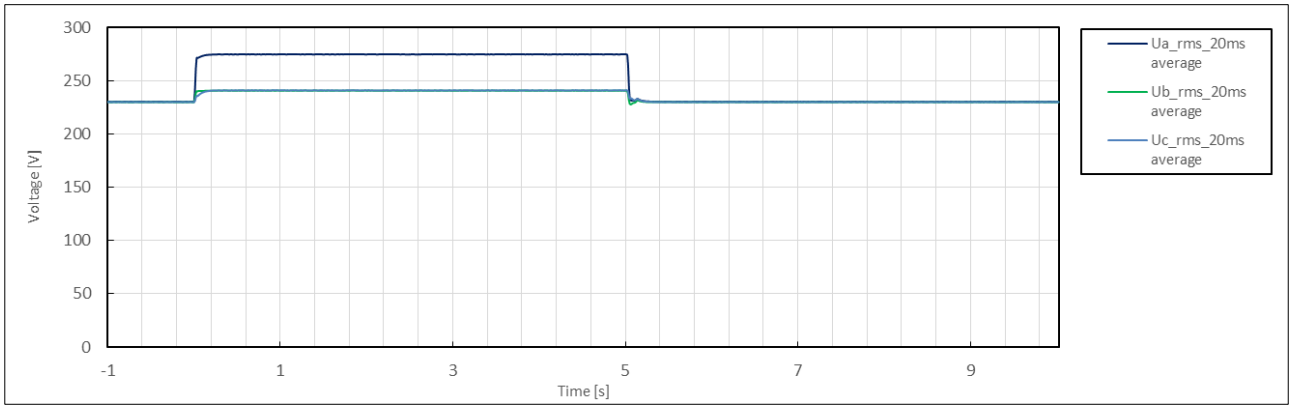


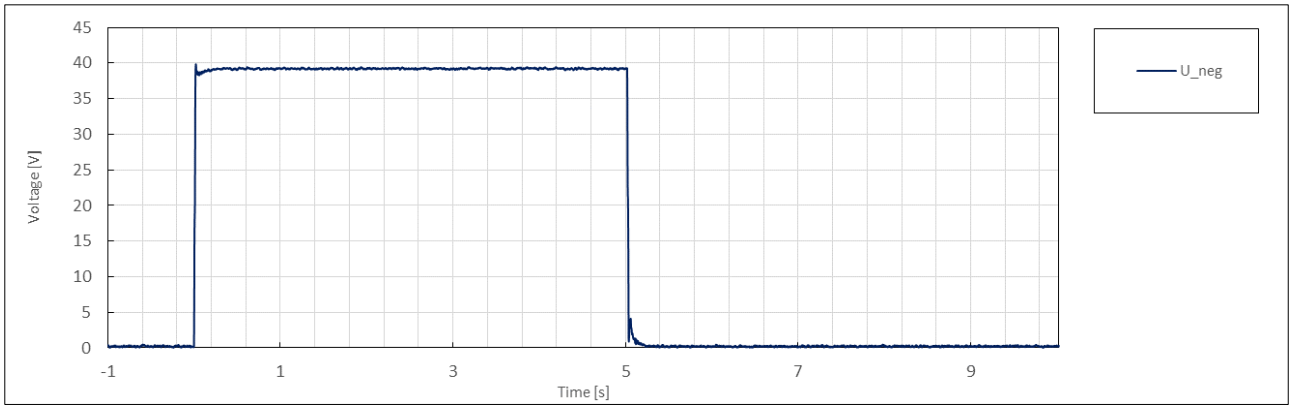


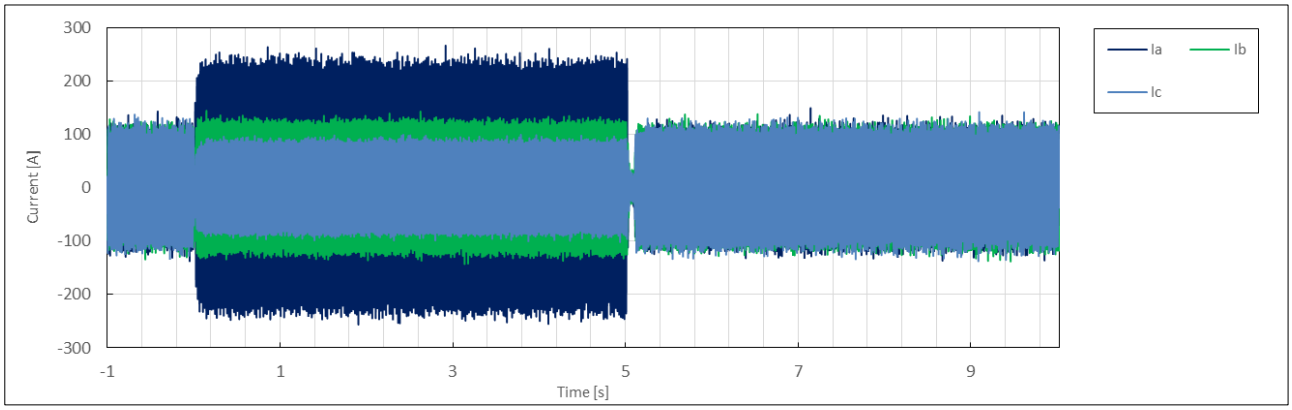
No. 7.4 Load Test

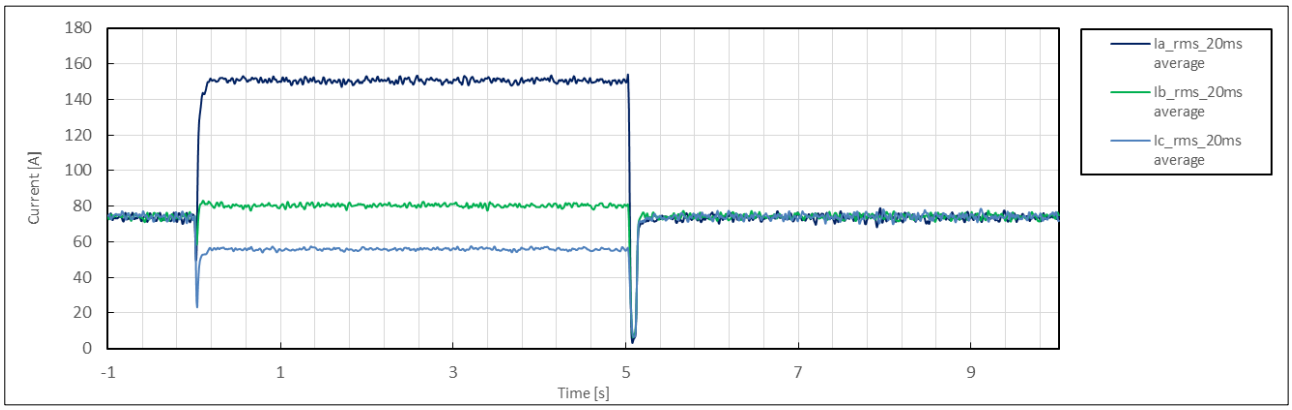


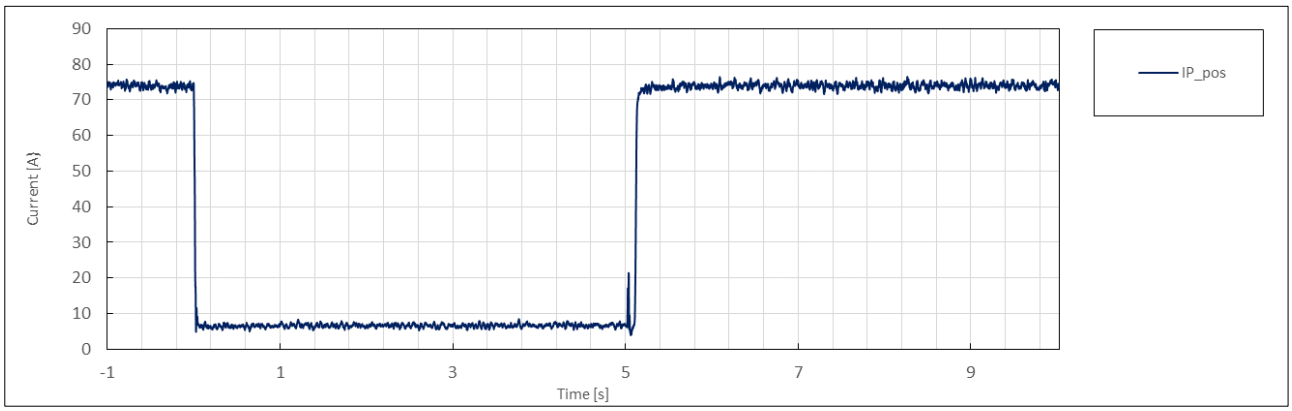


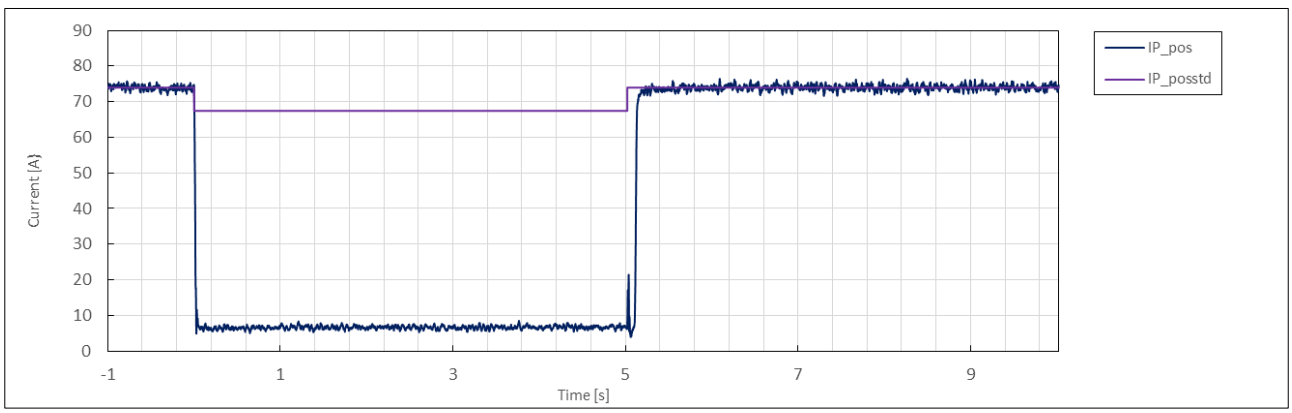


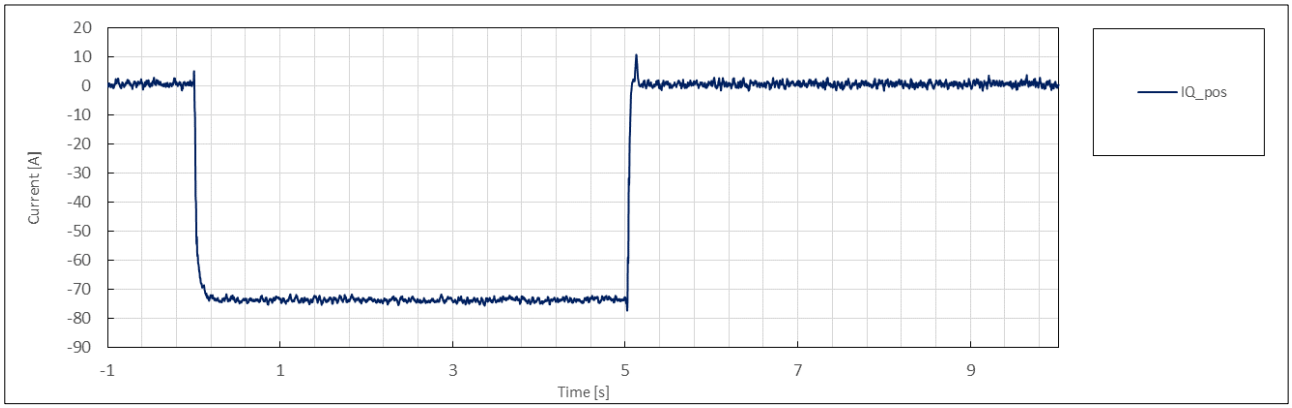


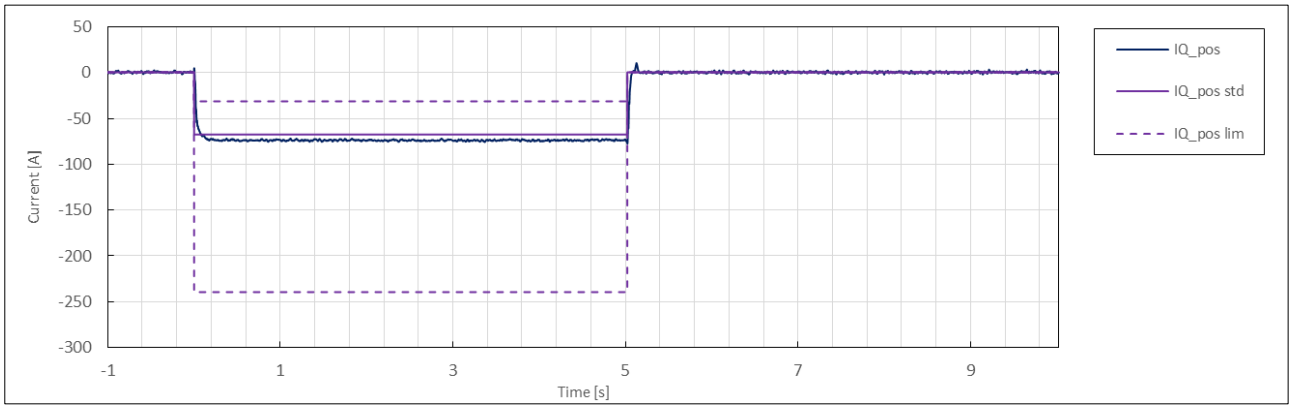

Current [A]
Time [s]
Ia
Ib
Ic

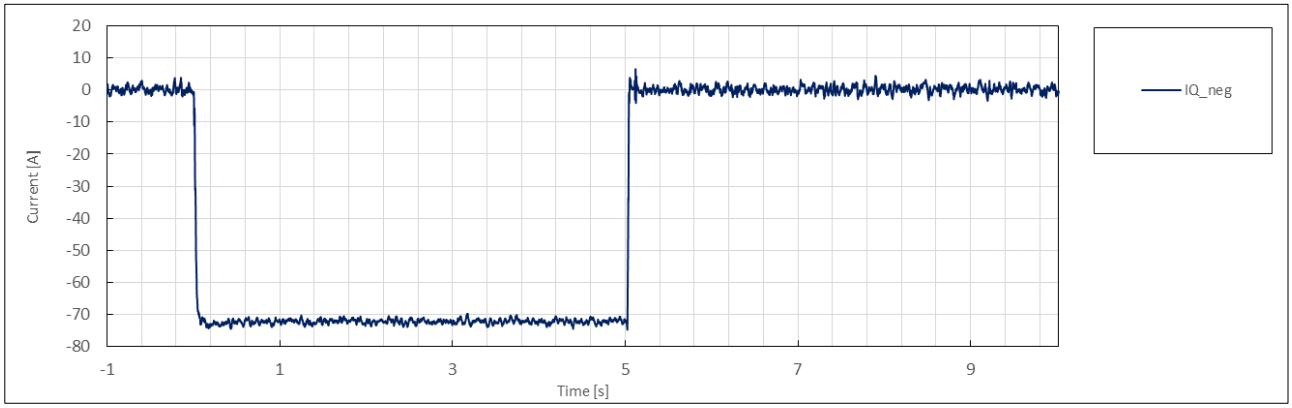

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

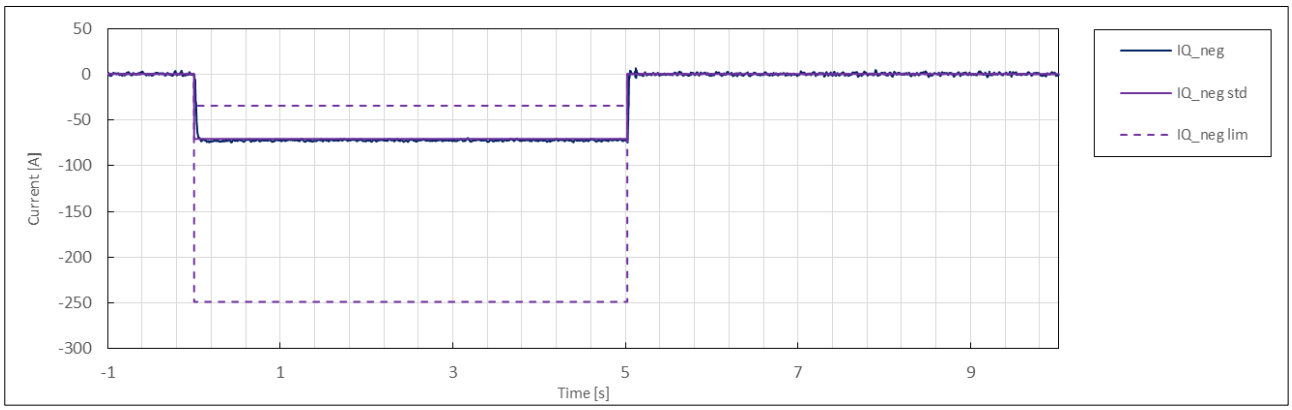

Current [A]
Time [s]
IP_pos

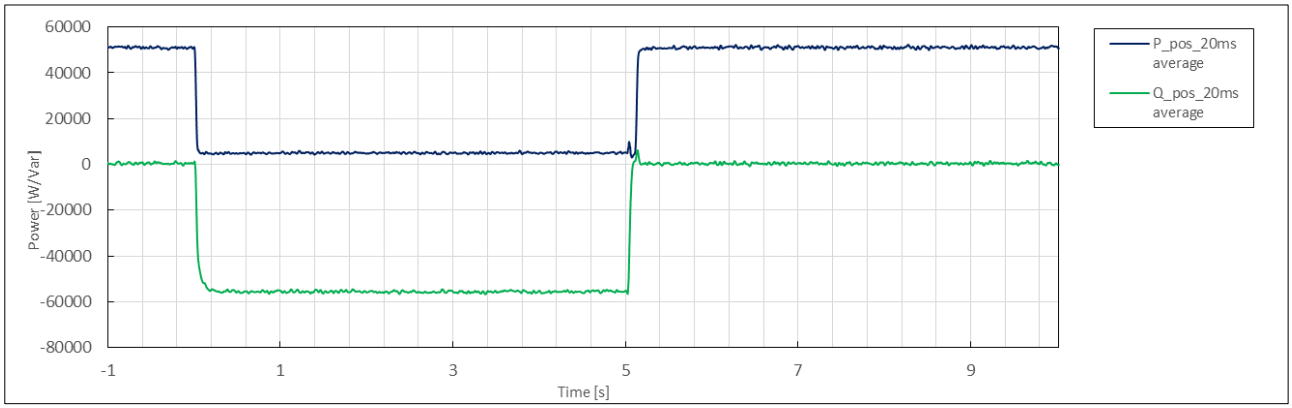

Current [A]
Time [s]
IP_pos
IP_posstd


20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_pos

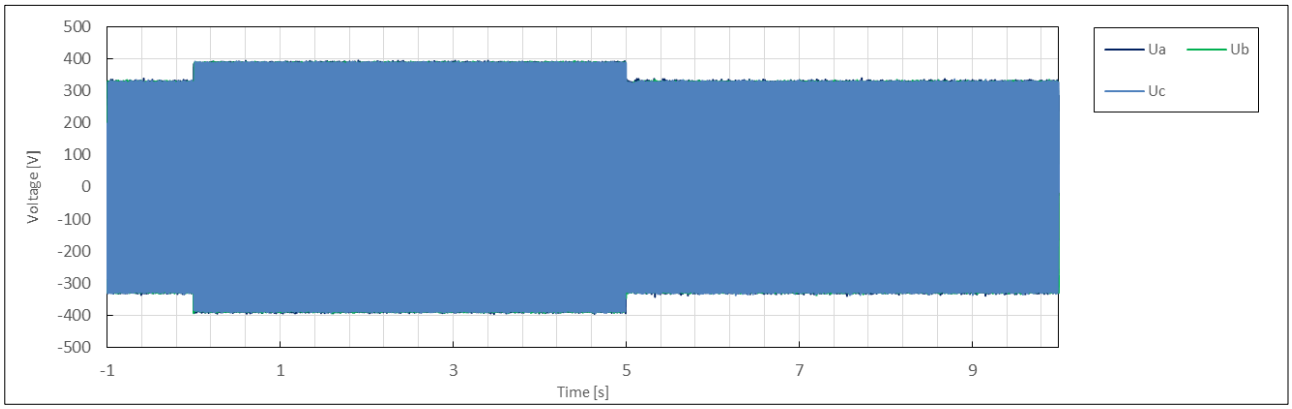

50
0
-50
-100
-150
-200
-250
-300
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

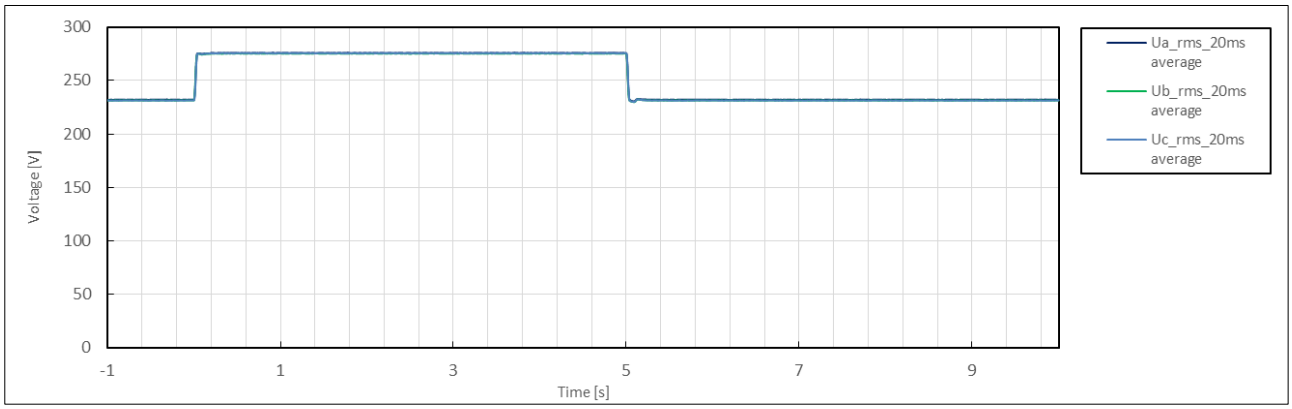

20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_neg

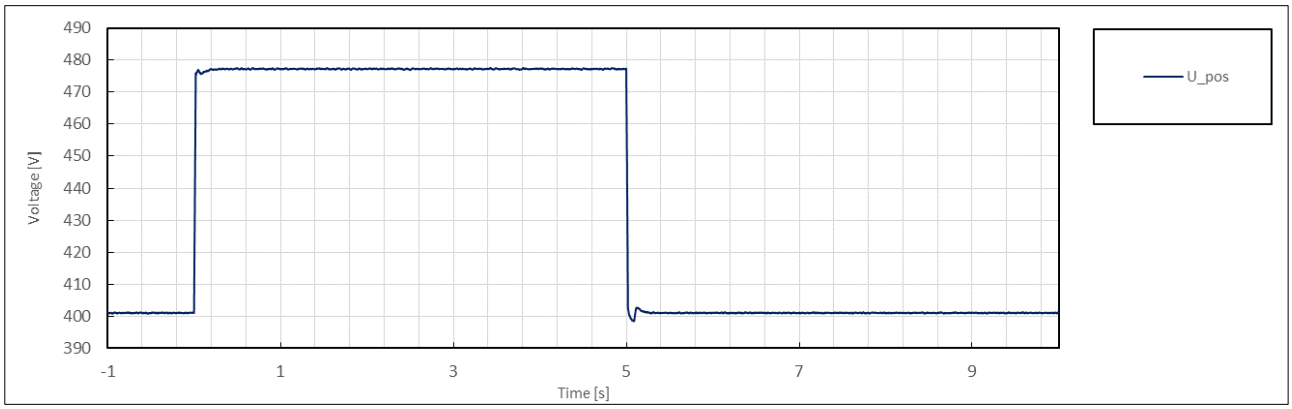

50
0
-50
-100
-150
-200
-250
-300
Current [A]
-1
1
3
5
7
9
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


60000
40000
20000
0
-20000
-40000
-60000
-80000
Power [W/Var]
-1
1
3
5
7
9
Time [s]
P_pos_20ms average
Q_pos_20ms average

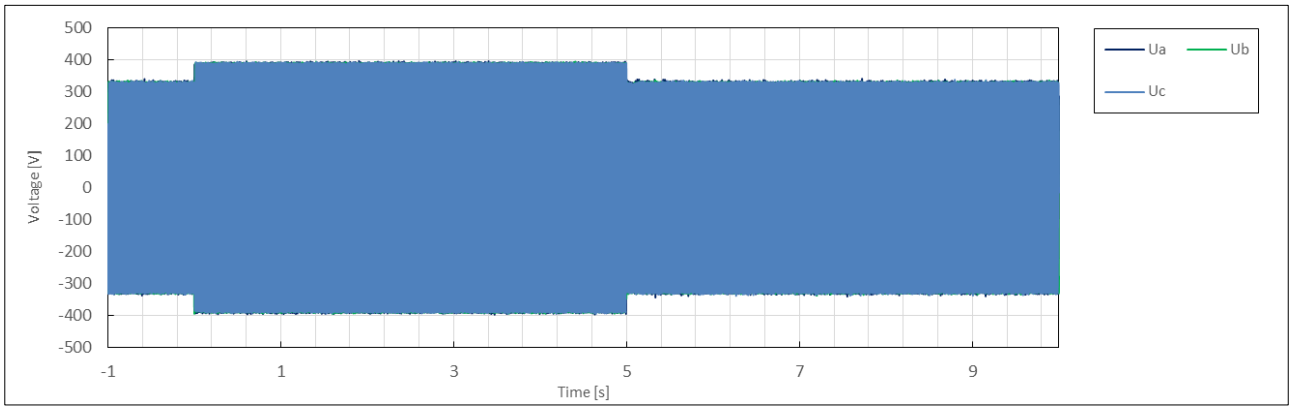
No. 7.5 Idle Test

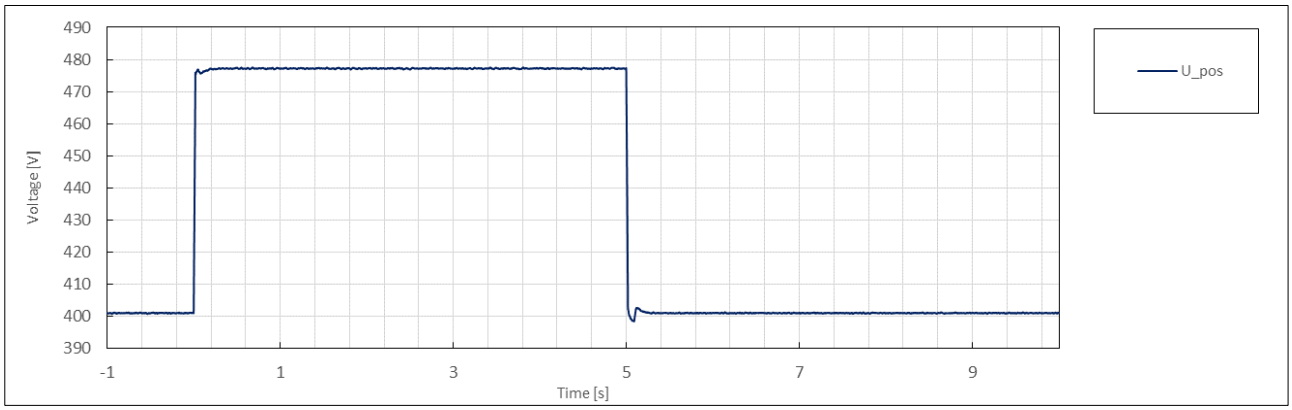


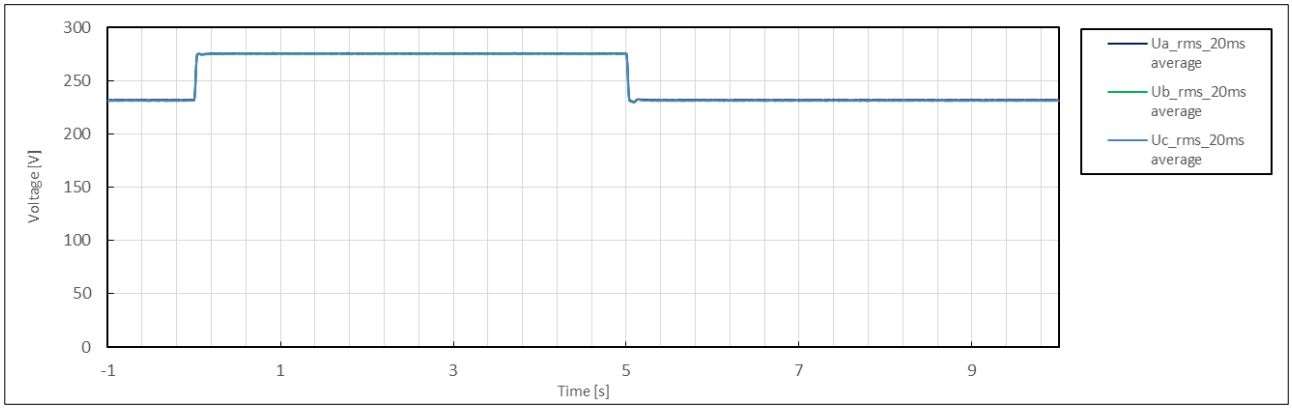


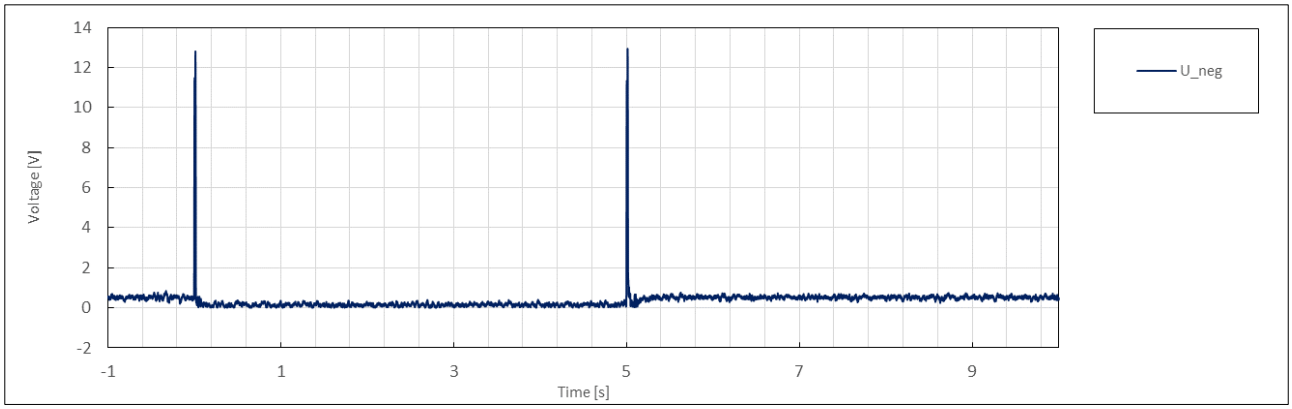


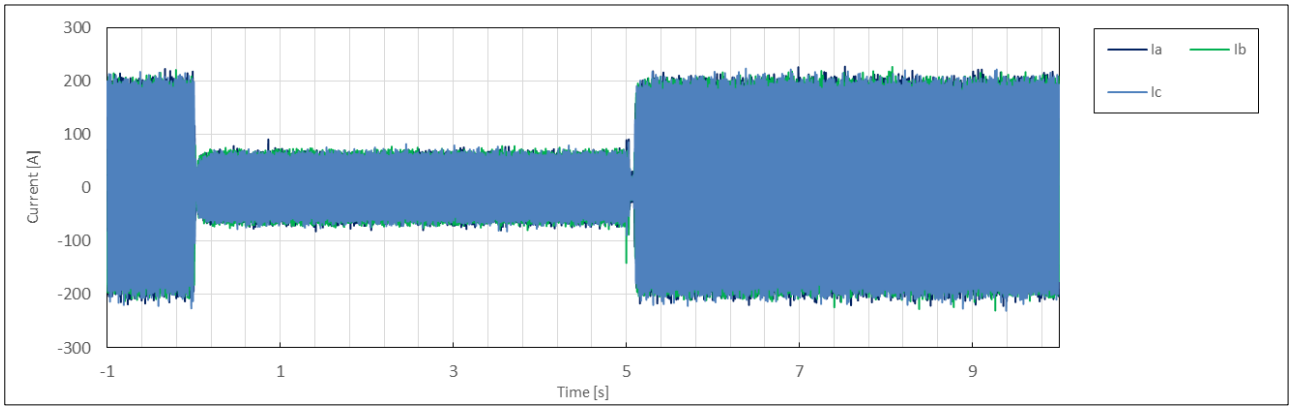
No. 7.5 Load Test

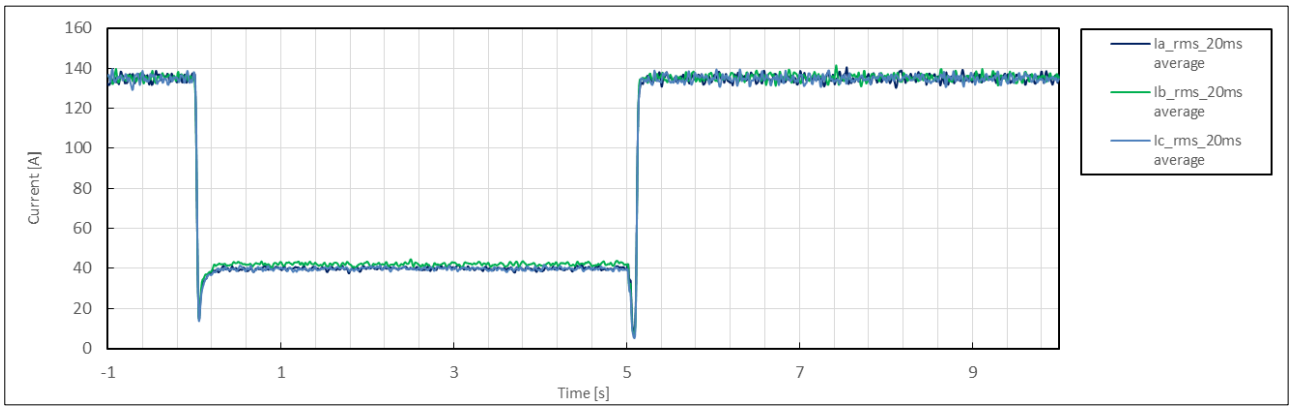


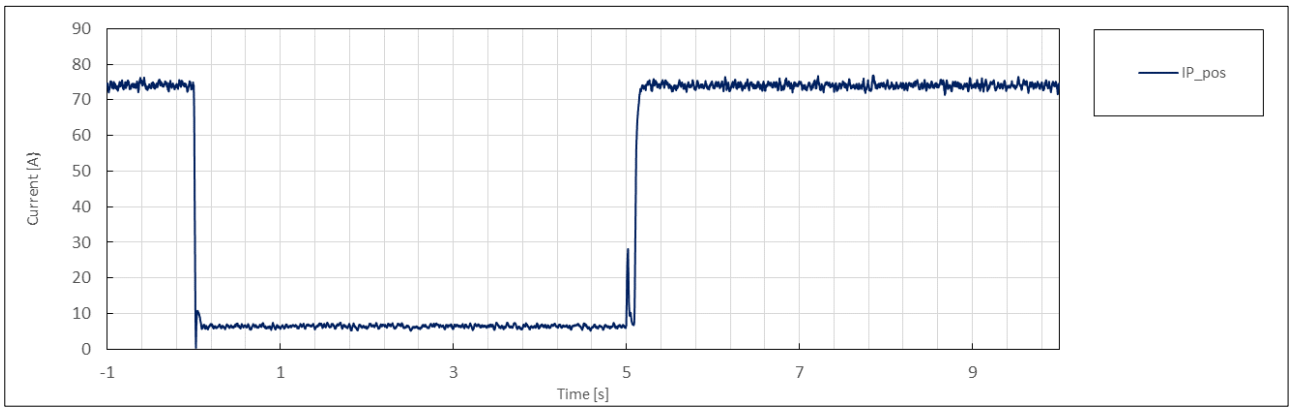


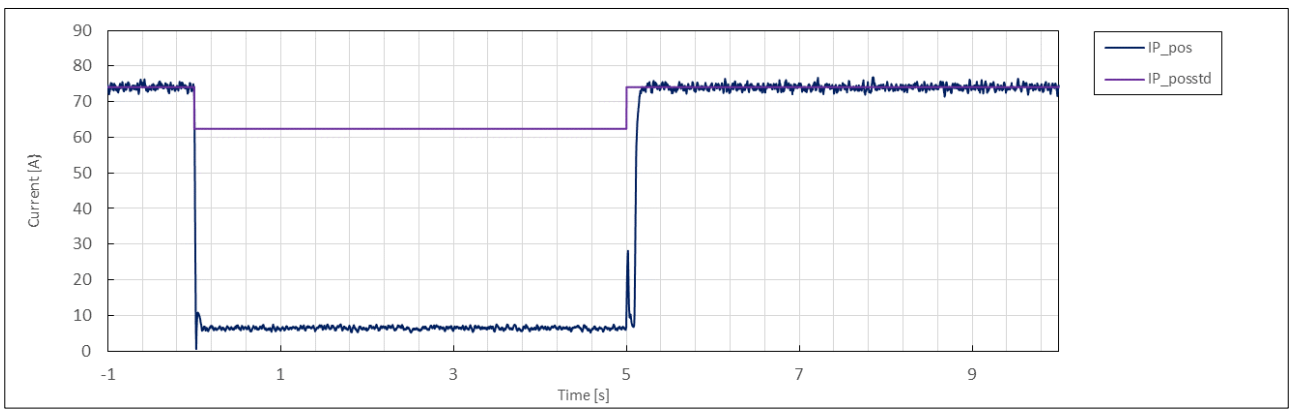


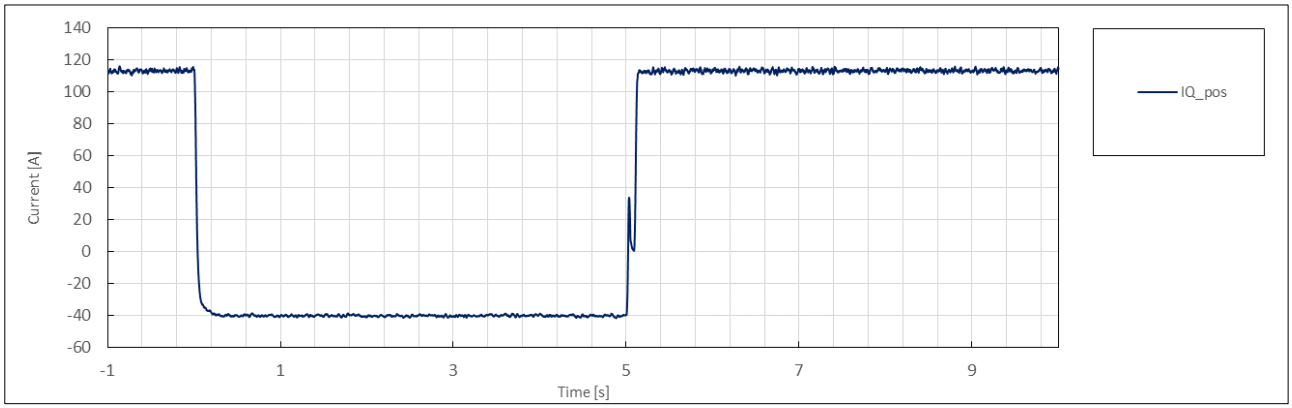


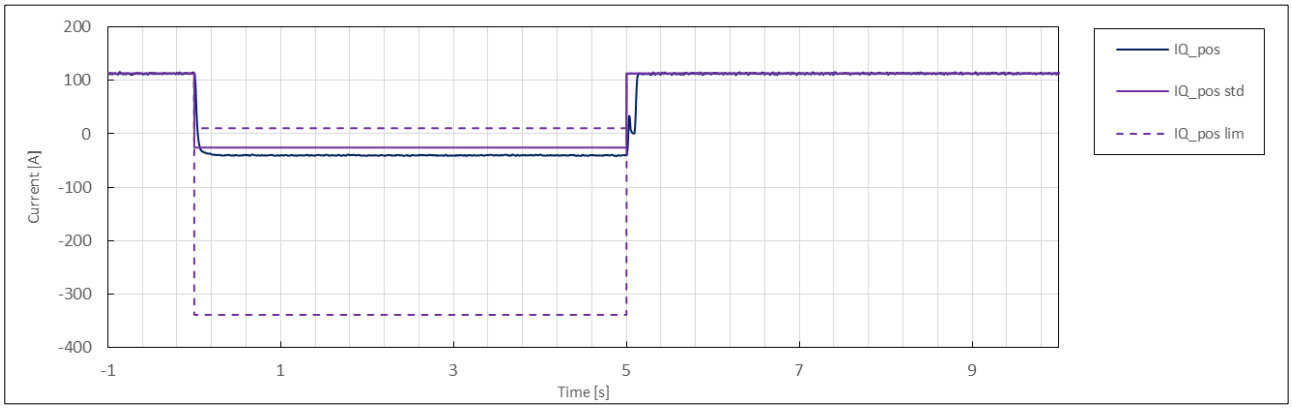

Current [A]
Time [s]
Ia
Ib
Ic

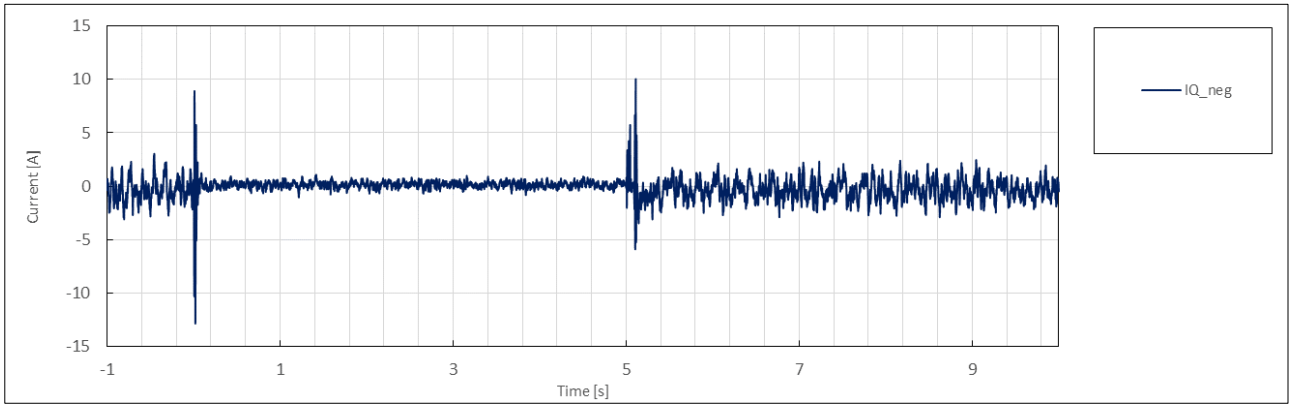

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

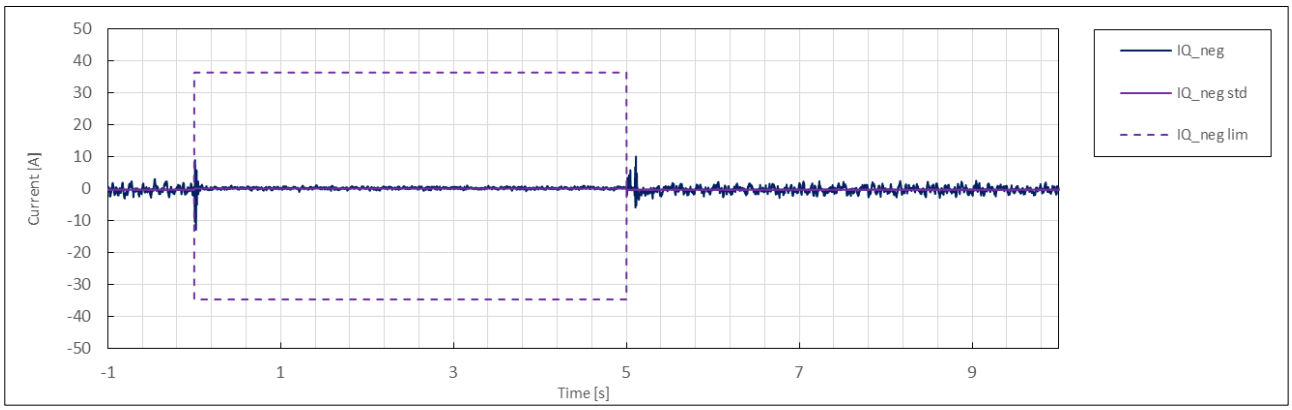

Current [A]
Time [s]
IP_pos

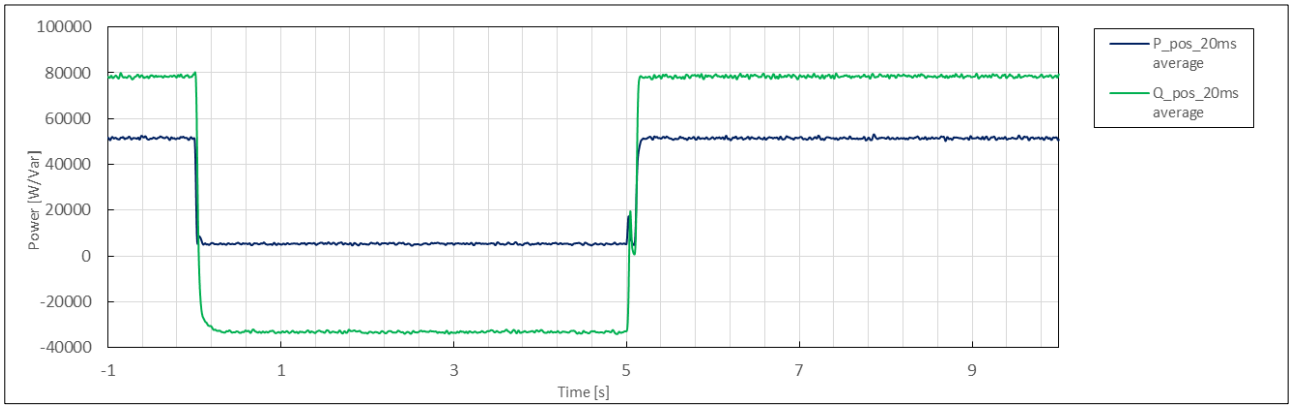

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

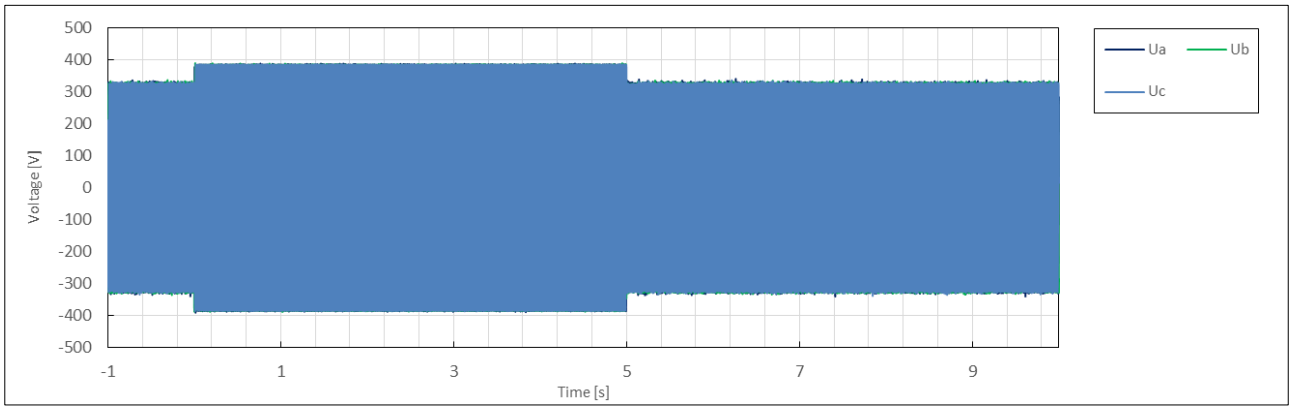

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

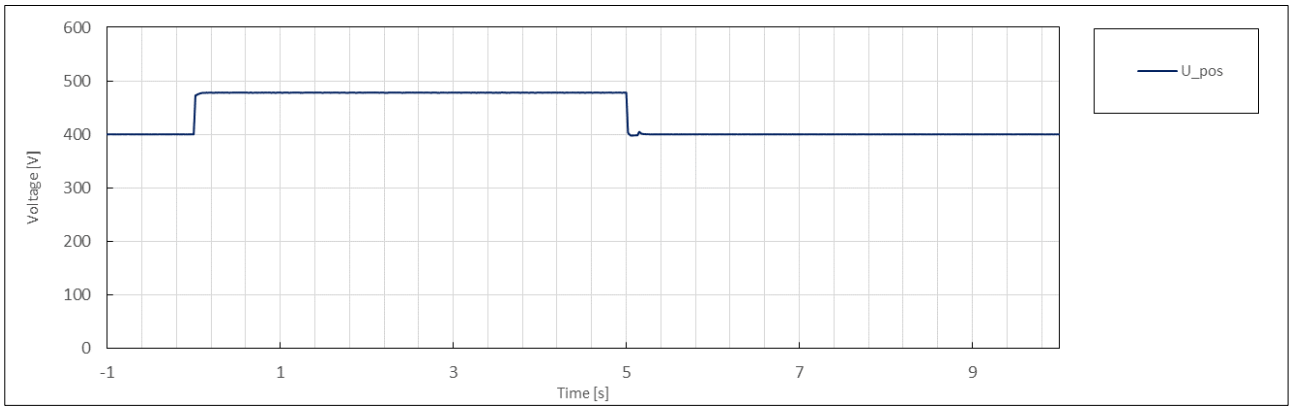

Current [A]
Time [s]
IQ_neg

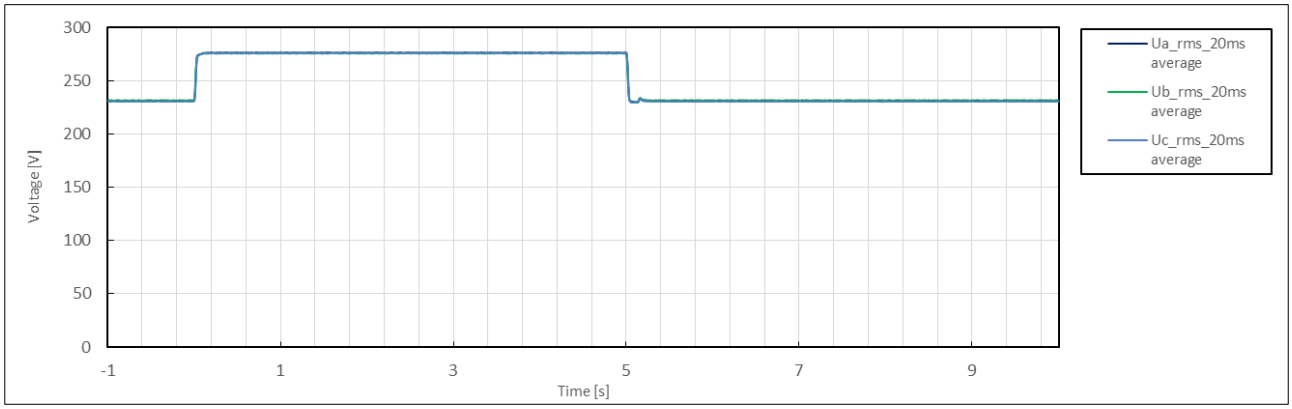

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


100000
80000
60000
40000
20000
0
-20000
-40000
Power [W/Var]
-1
1
3
5
7
9
Time [s]
P_pos_20ms average
Q_pos_20ms average

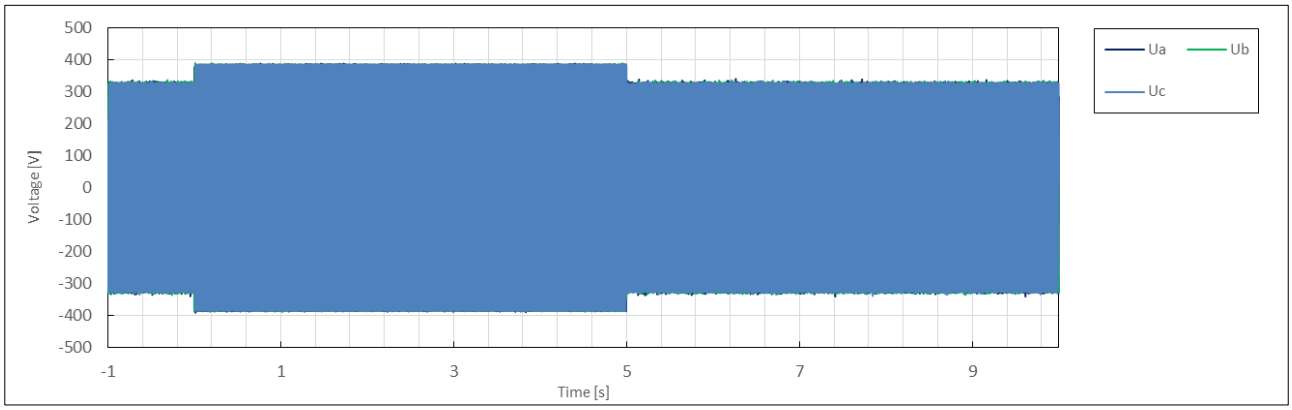
No. 7.6 Idle Test

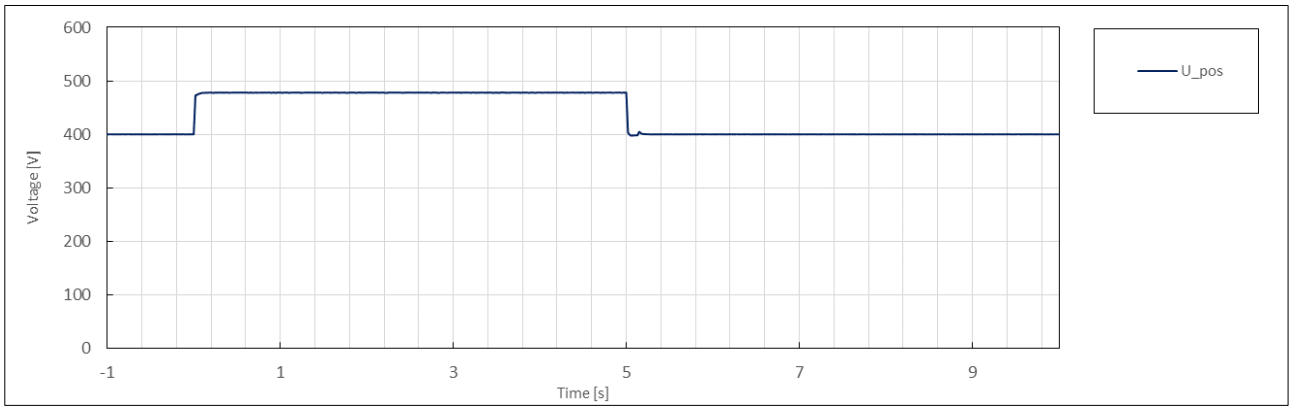


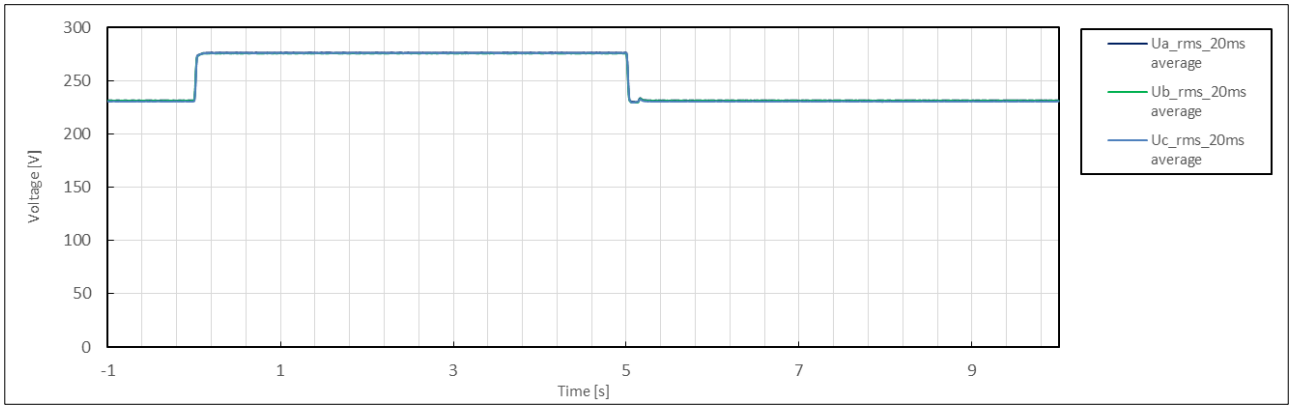


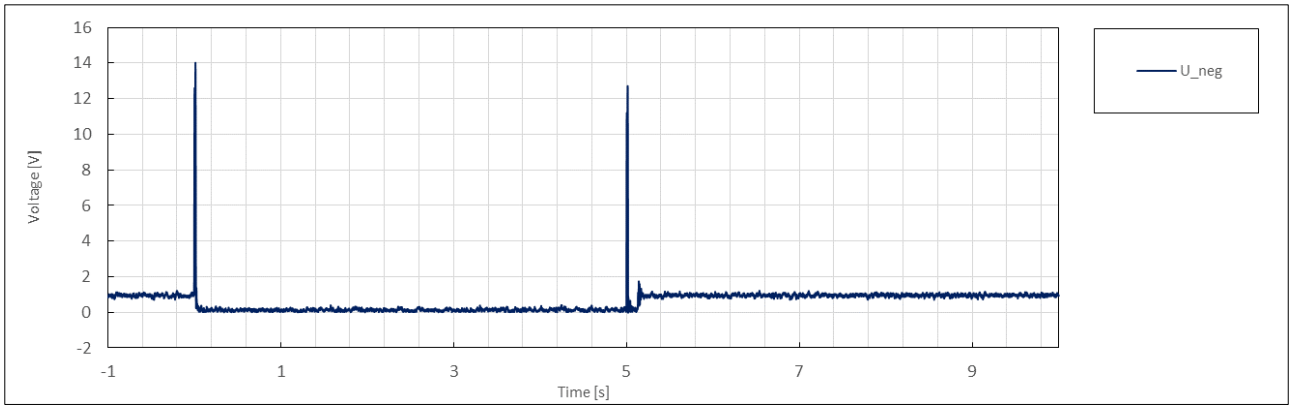


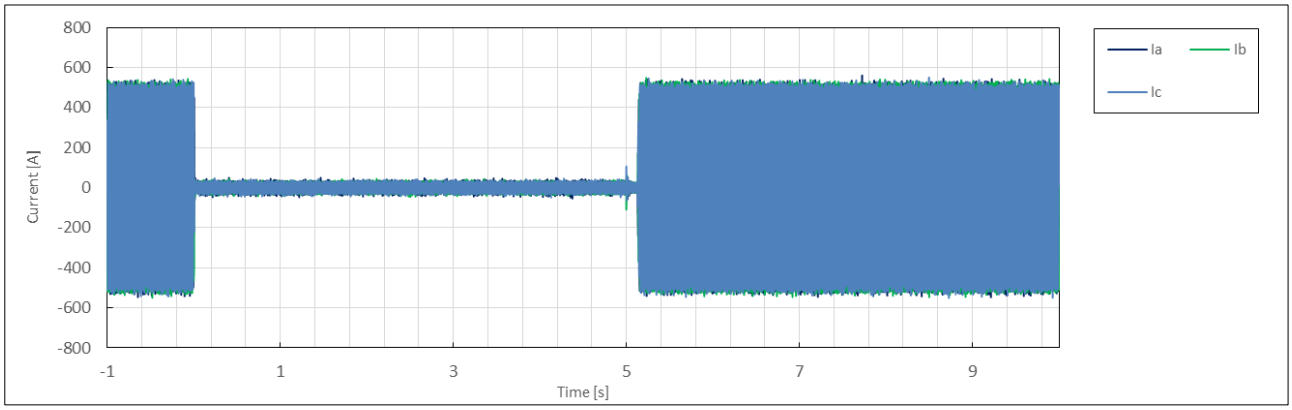
No. 7.6 Load Test

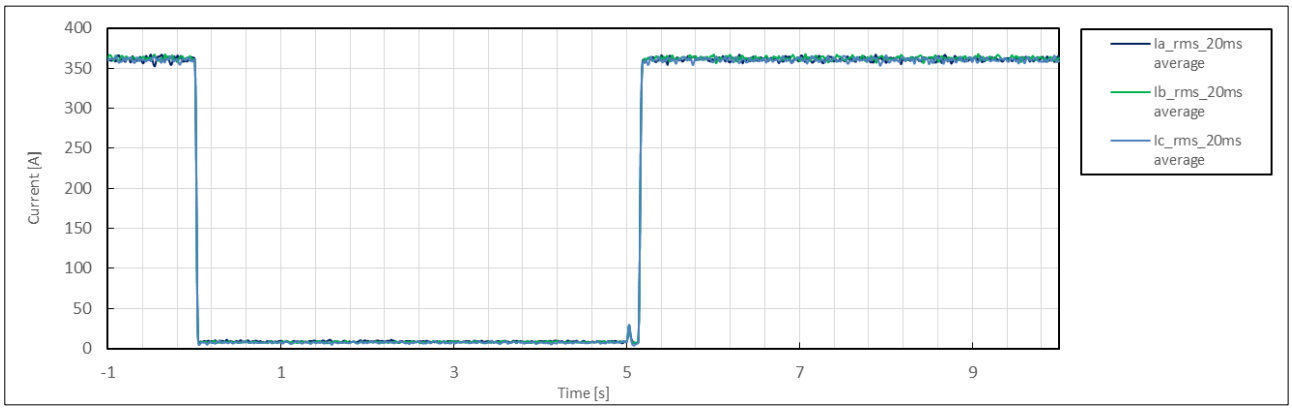


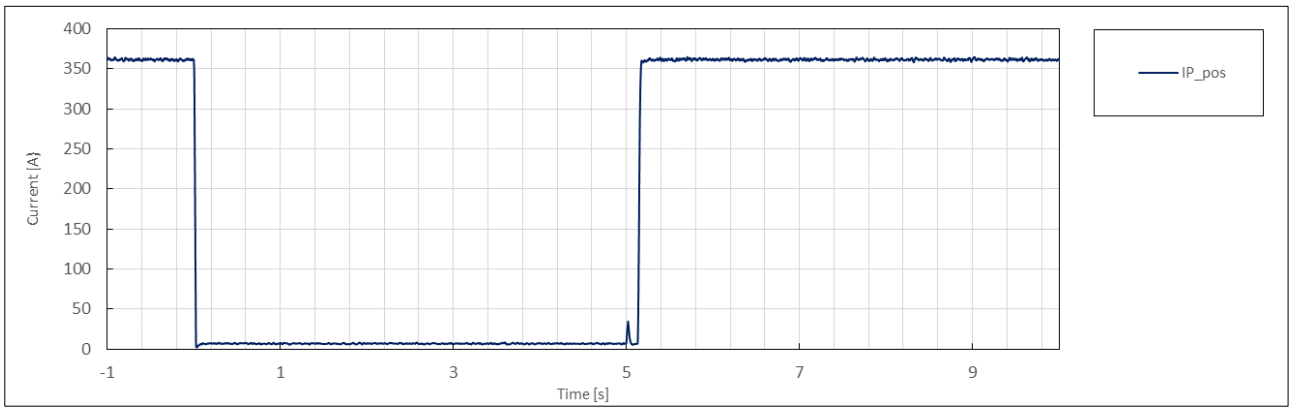


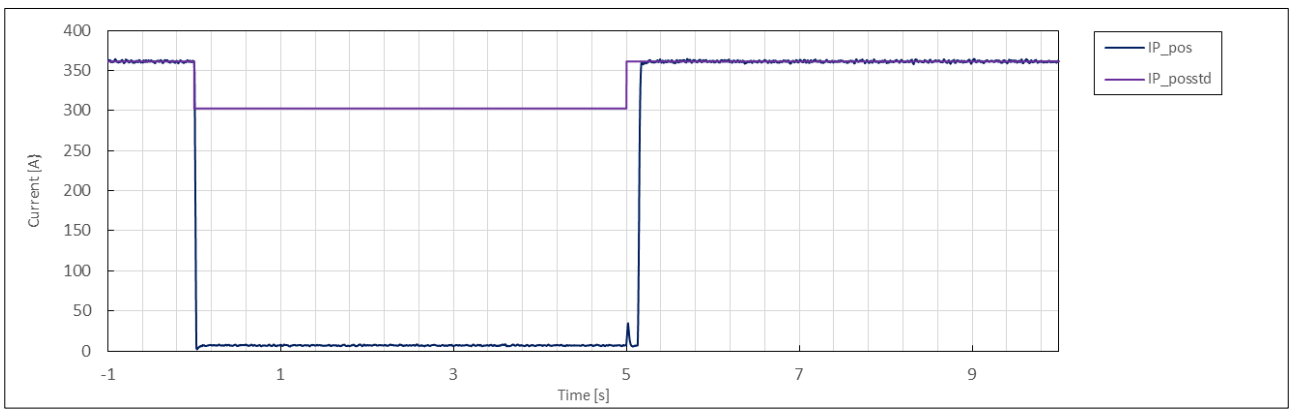


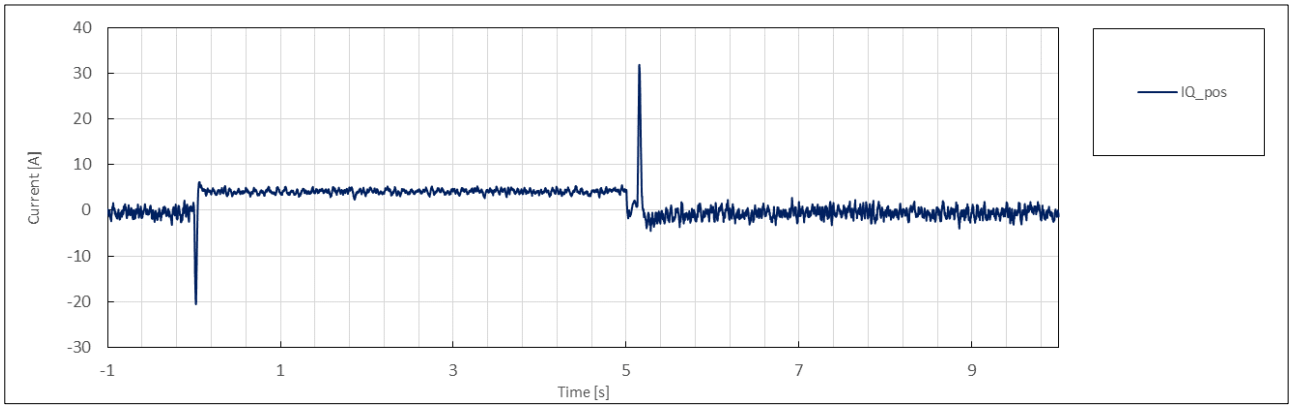


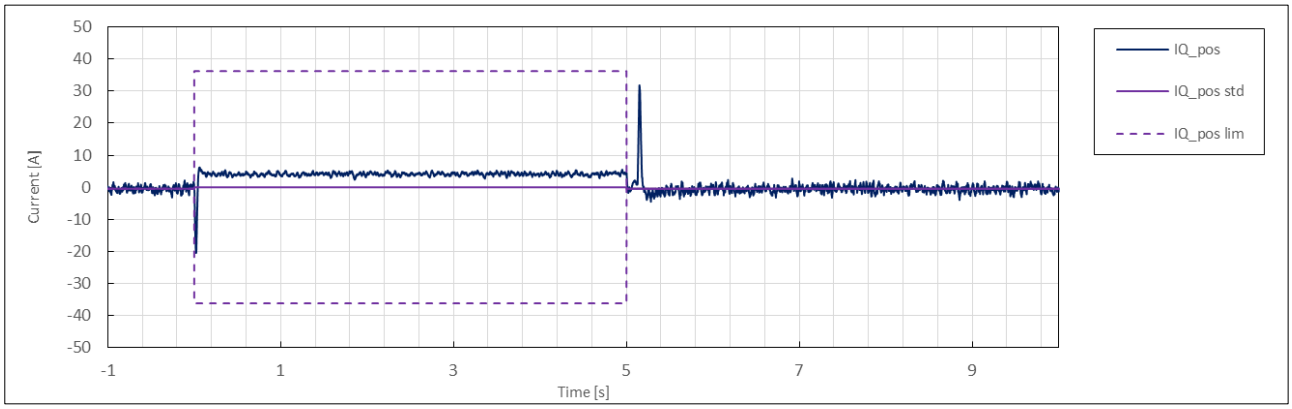

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
1
3
5
7
9
Time [s]
Ia
Ib
Ic

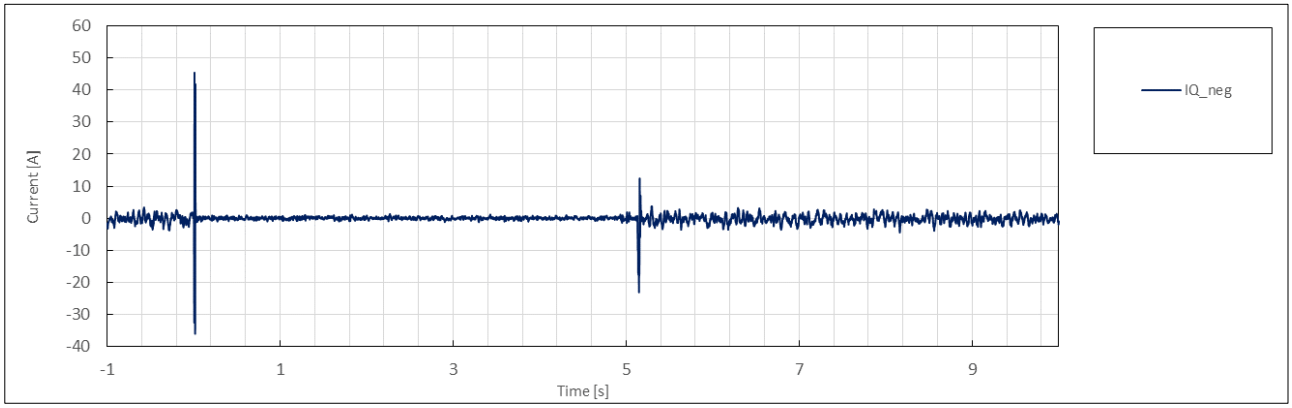

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

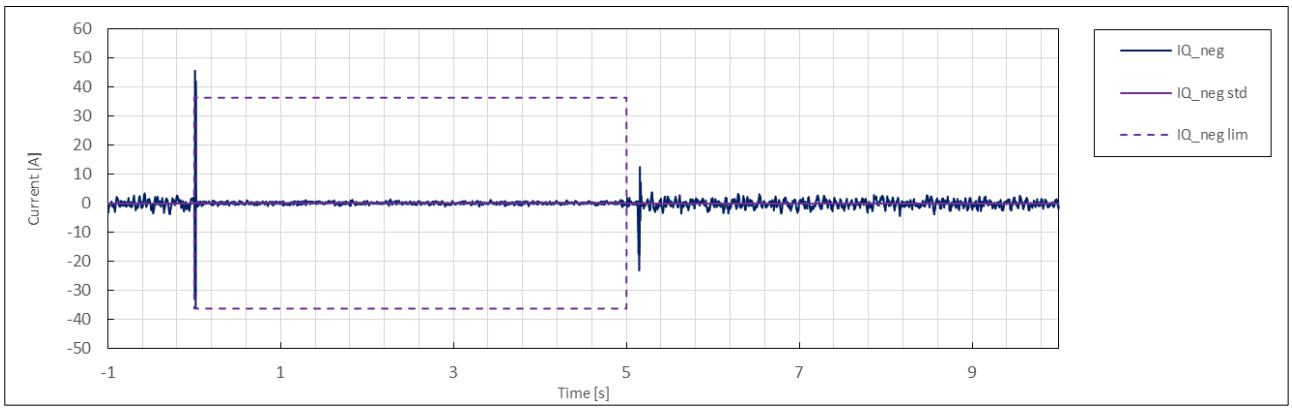

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
IP_pos

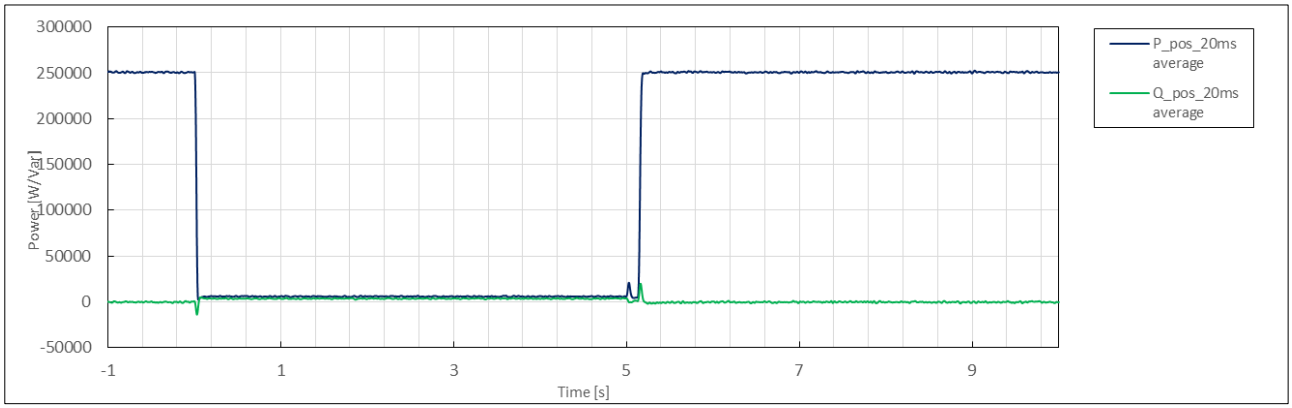

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

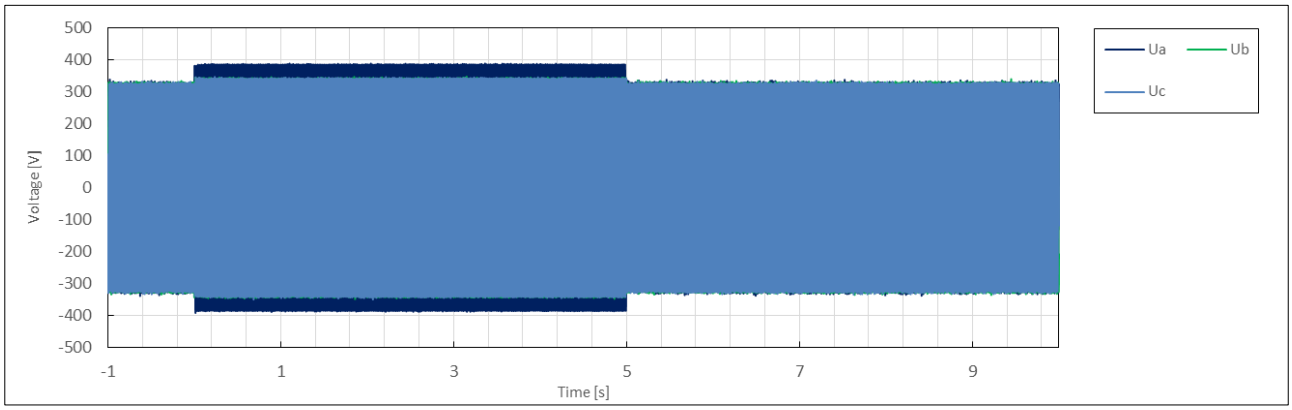

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

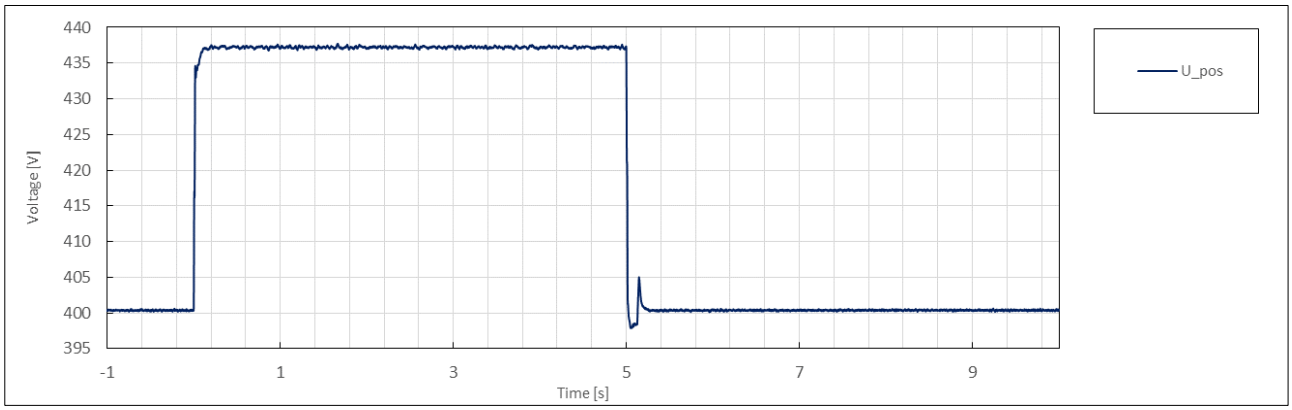

Current [A]
Time [s]
IQ_neg

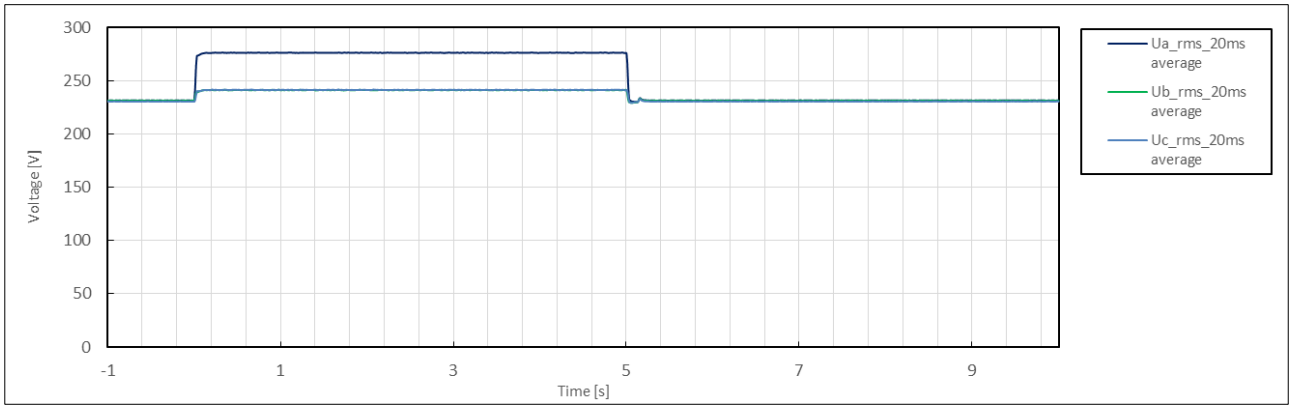

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
1
3
5
7
9
Time [s]
P_pos_20ms average
Q_pos_20ms average

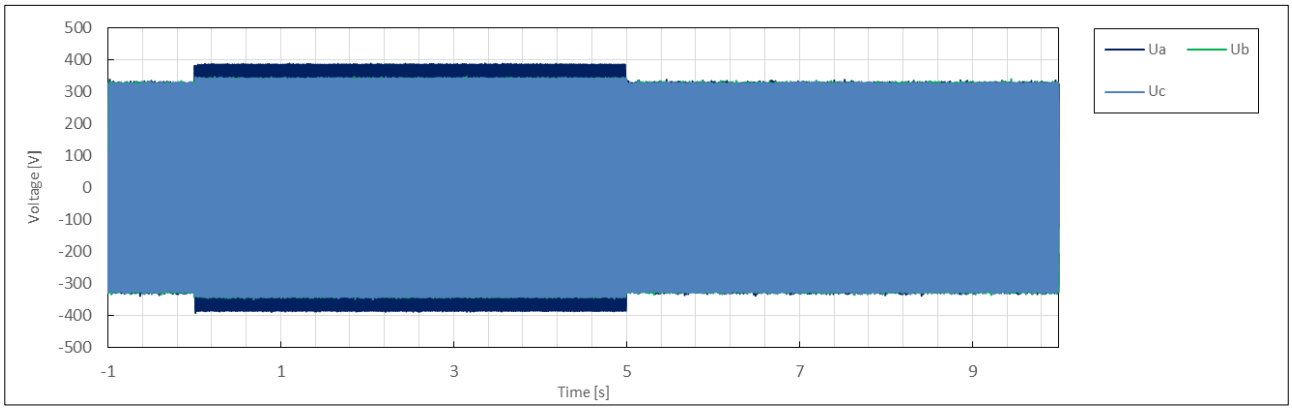
No. 7.7 Idle Test

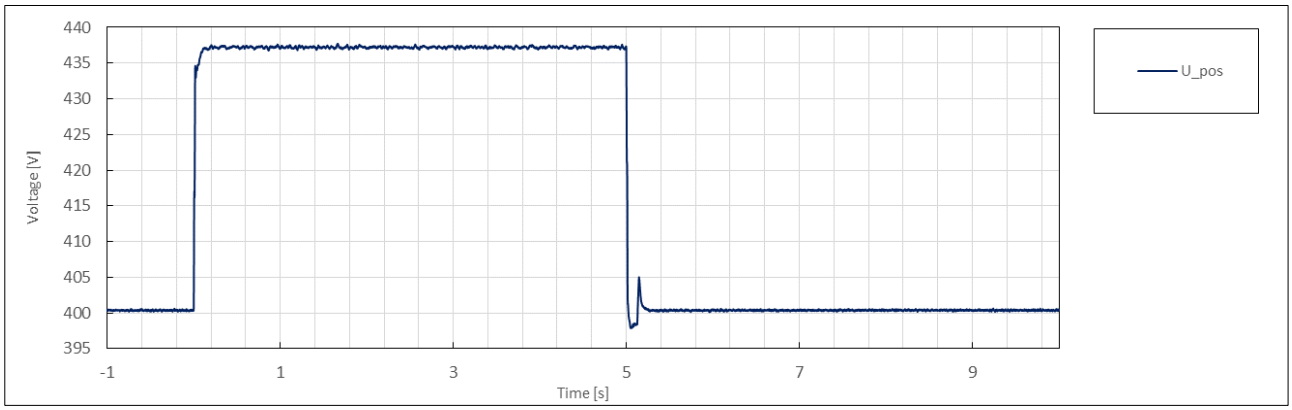


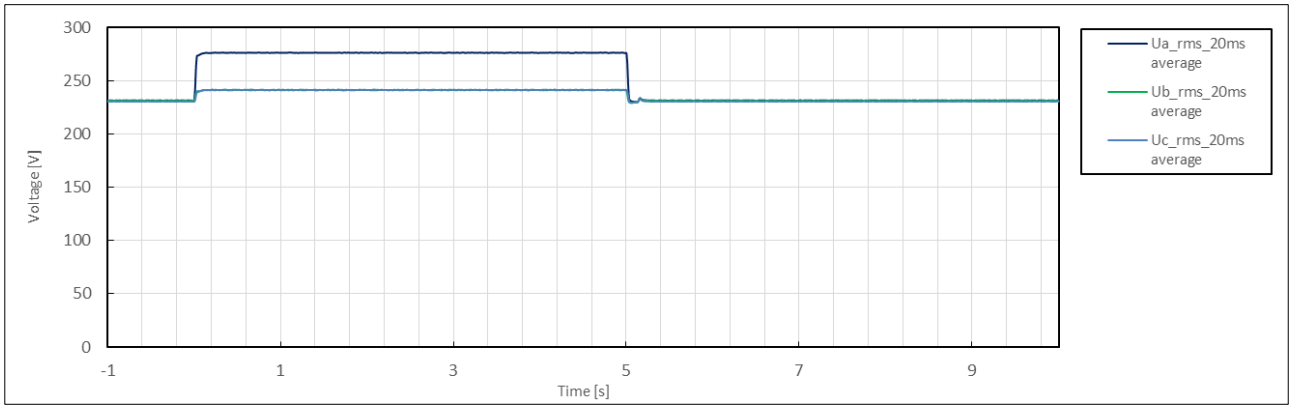


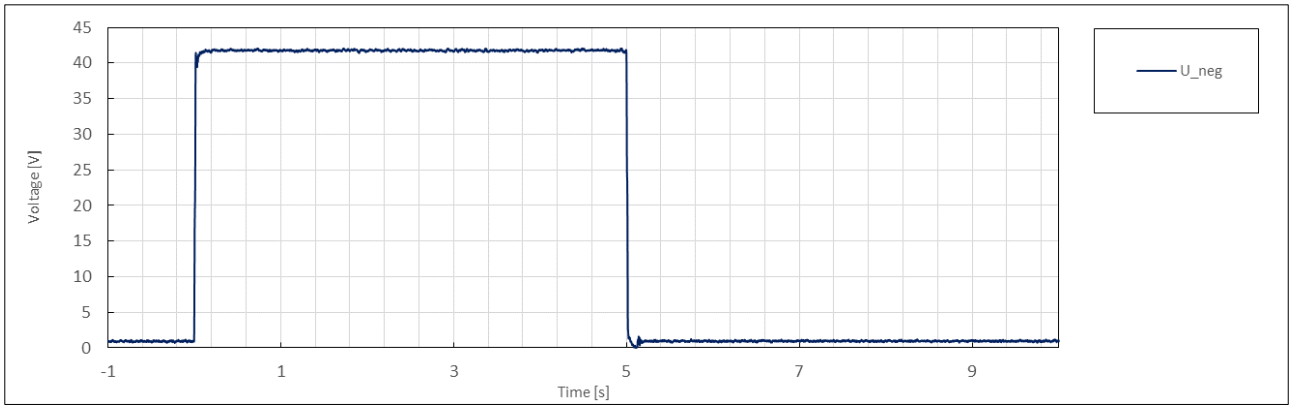


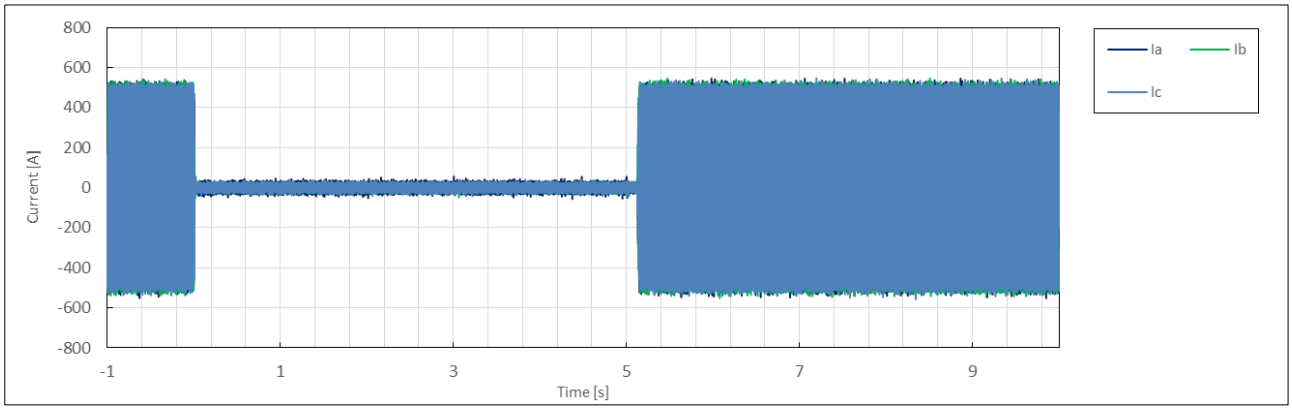
No. 7.7 Load Test

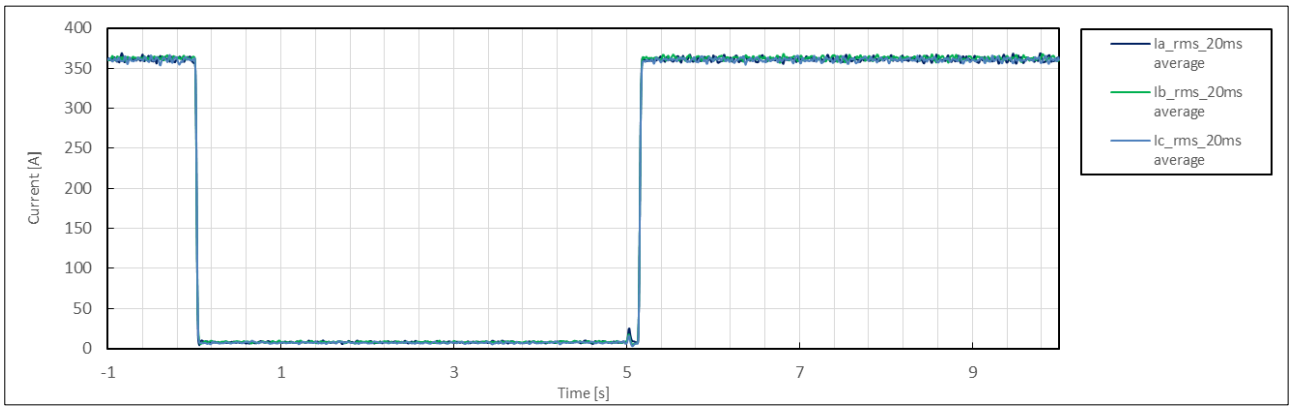


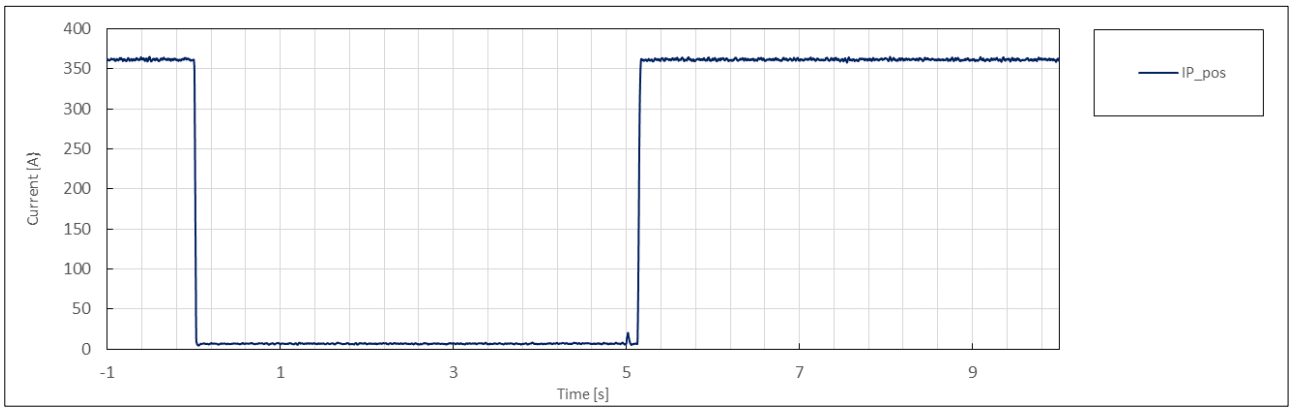


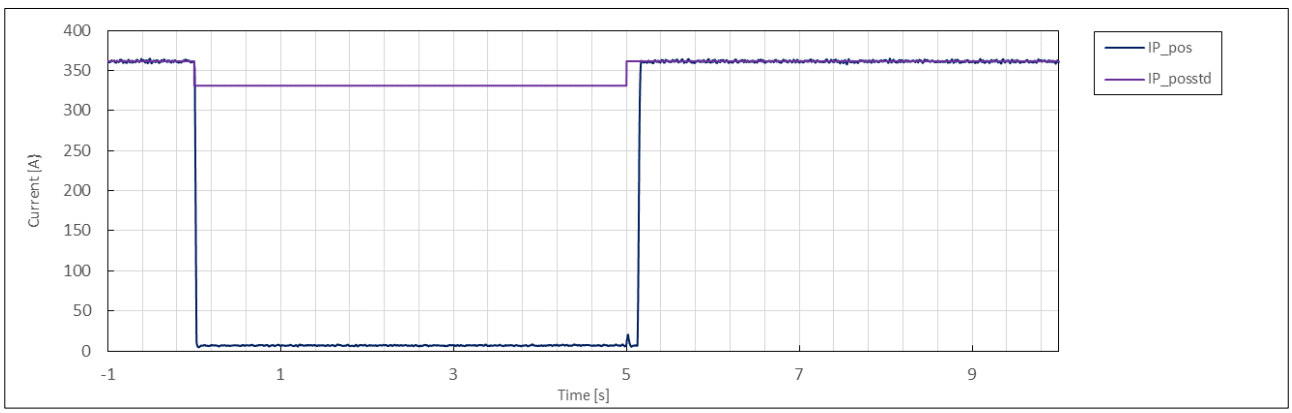


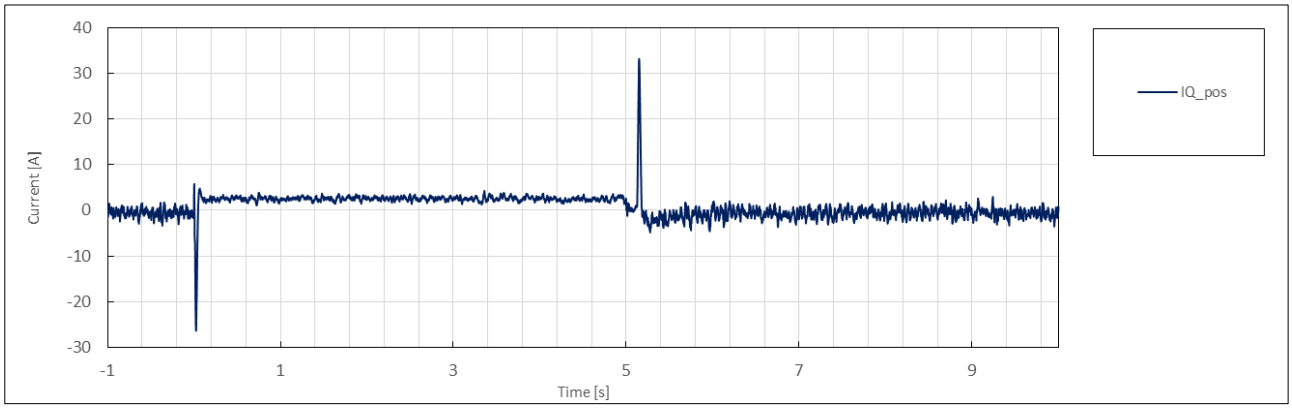


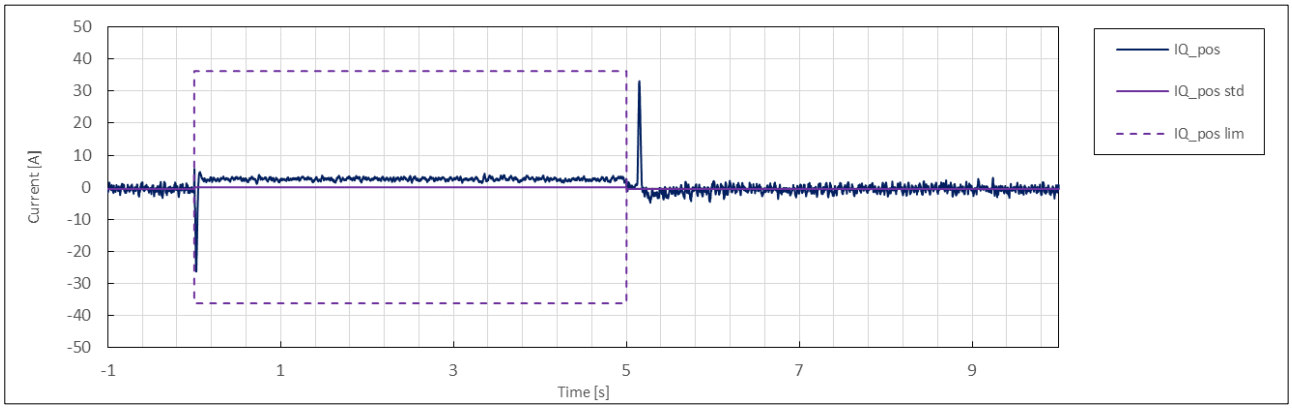

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
1
3
5
7
9
Time [s]
Ia
Ib
Ic

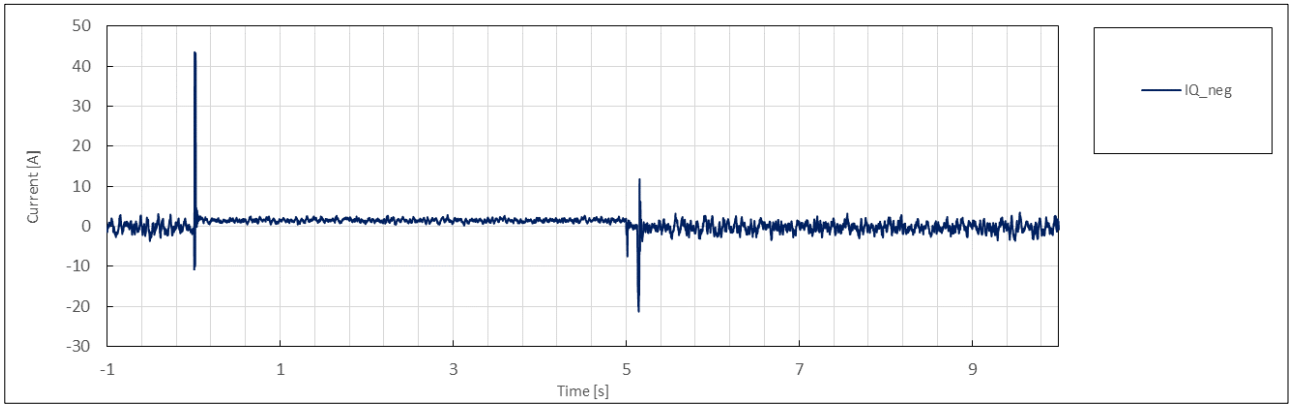

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

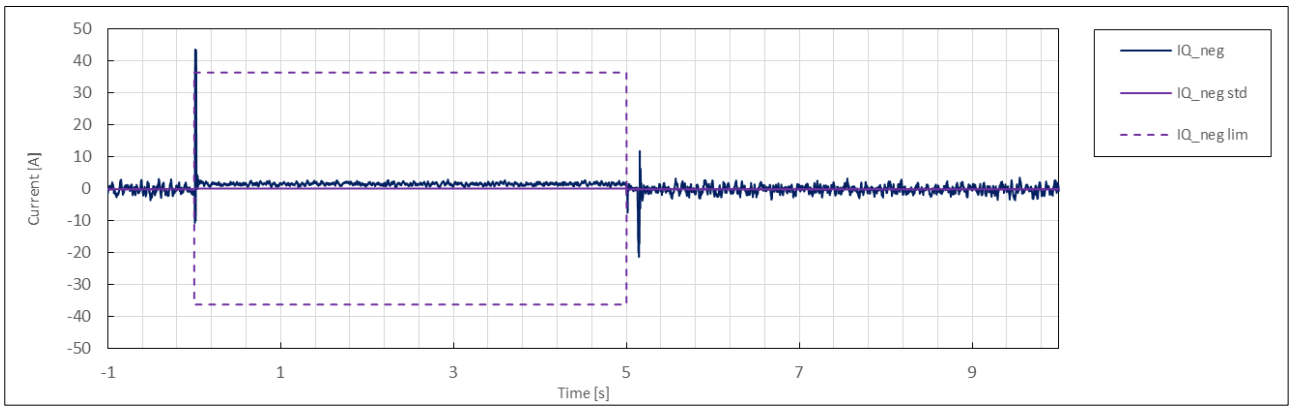

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
IP_pos

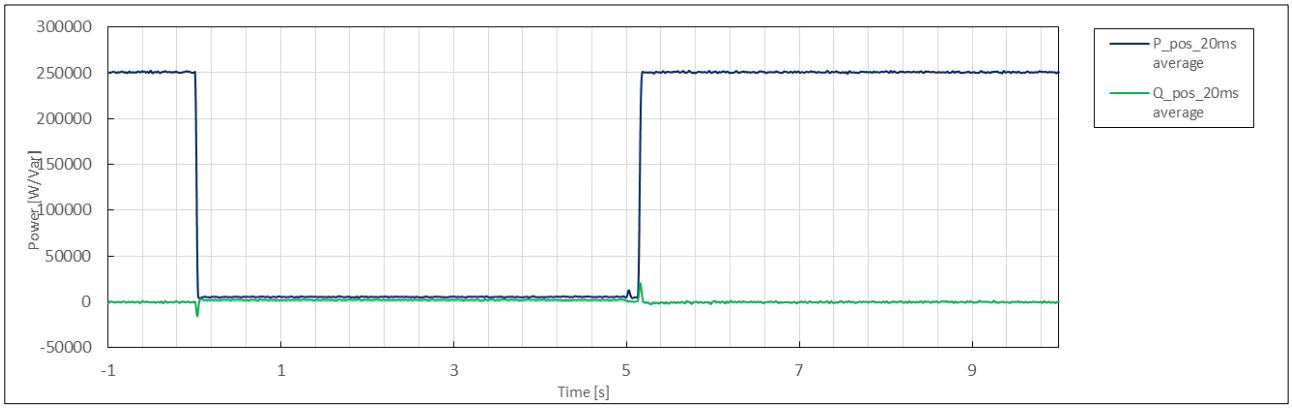

400
350
300
250
200
150
100
50
0
Current [A]
-1
1
3
5
7
9
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

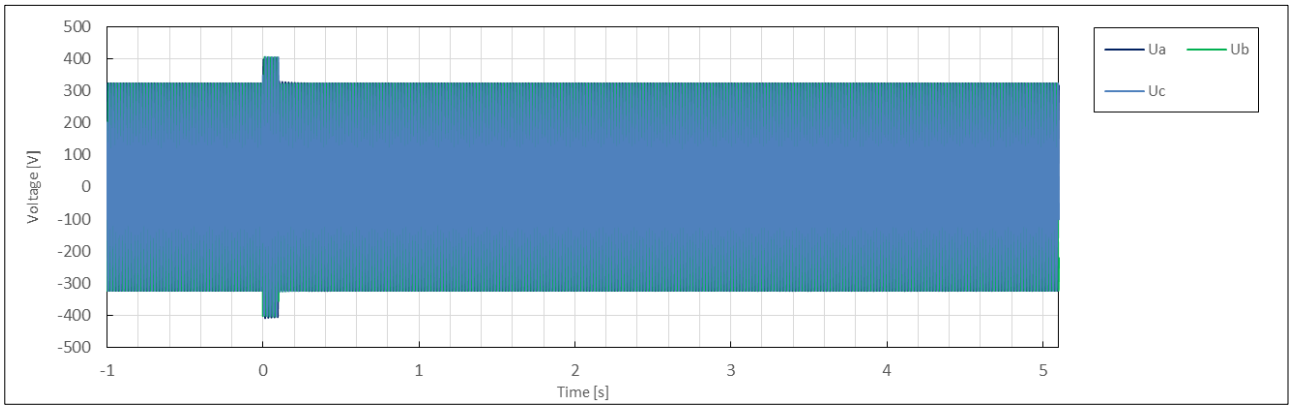

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

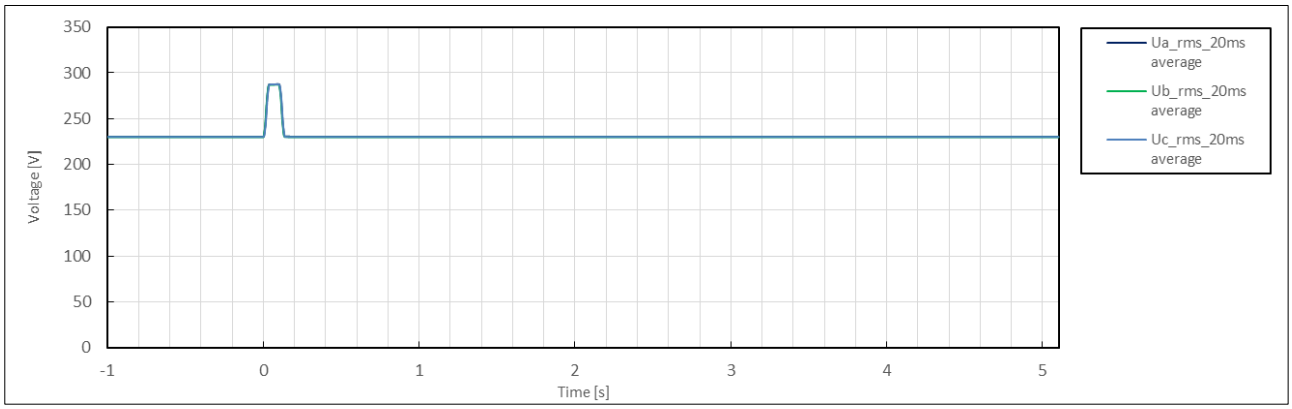

Current [A]
Time [s]
IQ_neg

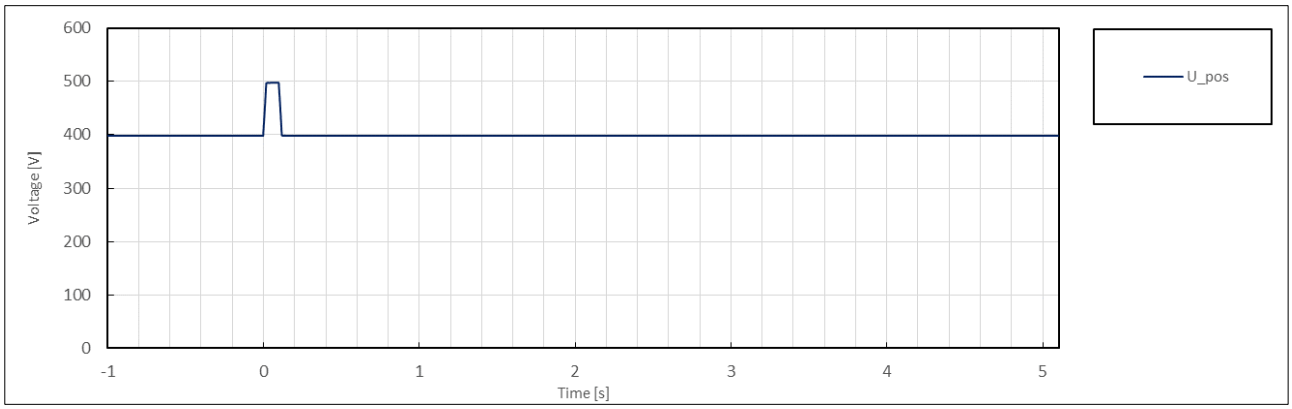

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
Power [W/Var]
-1
1
3
5
7
9
Time [s]
P_pos_20ms average
Q_pos_20ms average

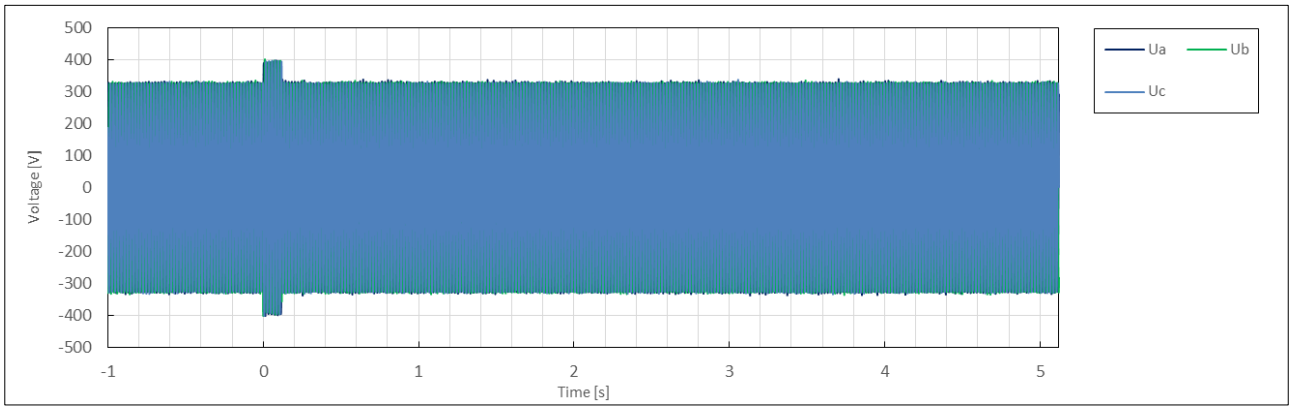
No. 8.1 Idle Test

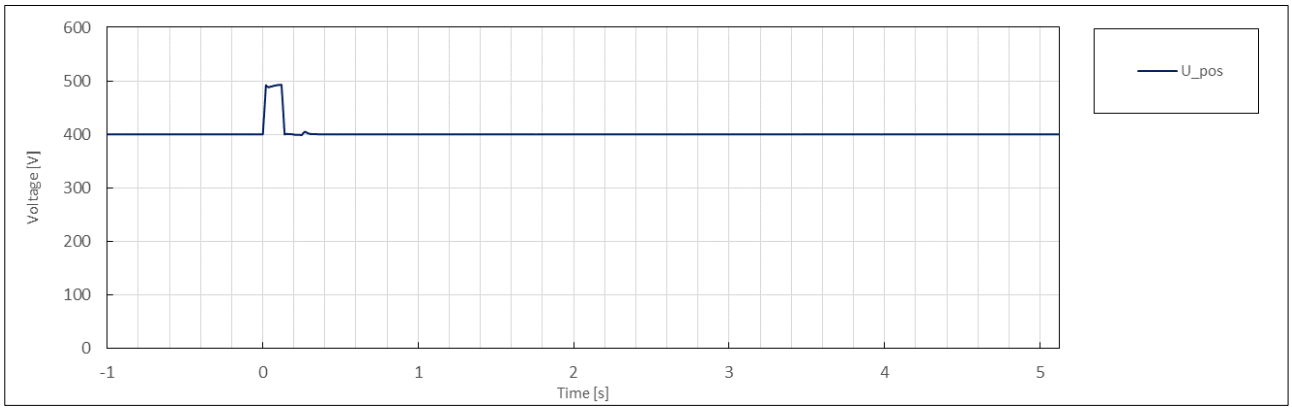


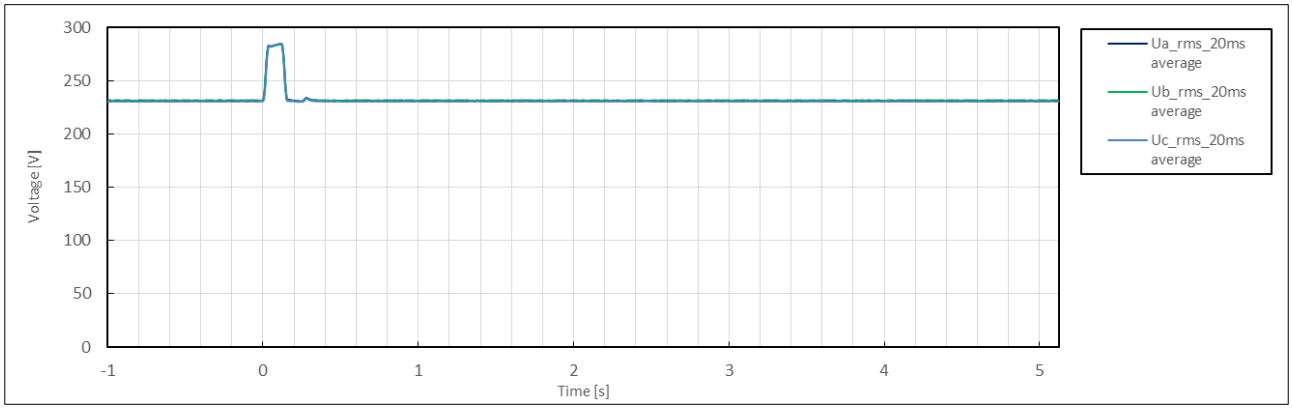


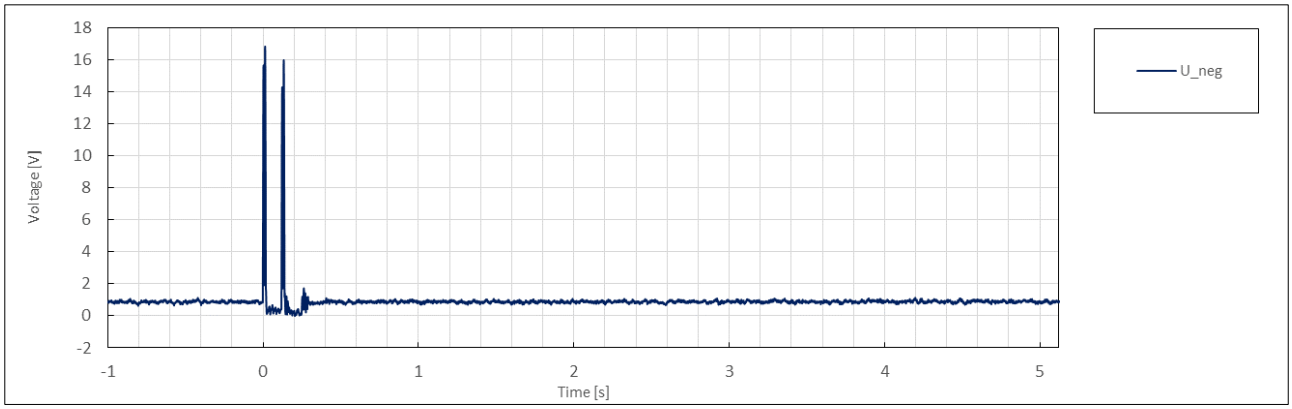


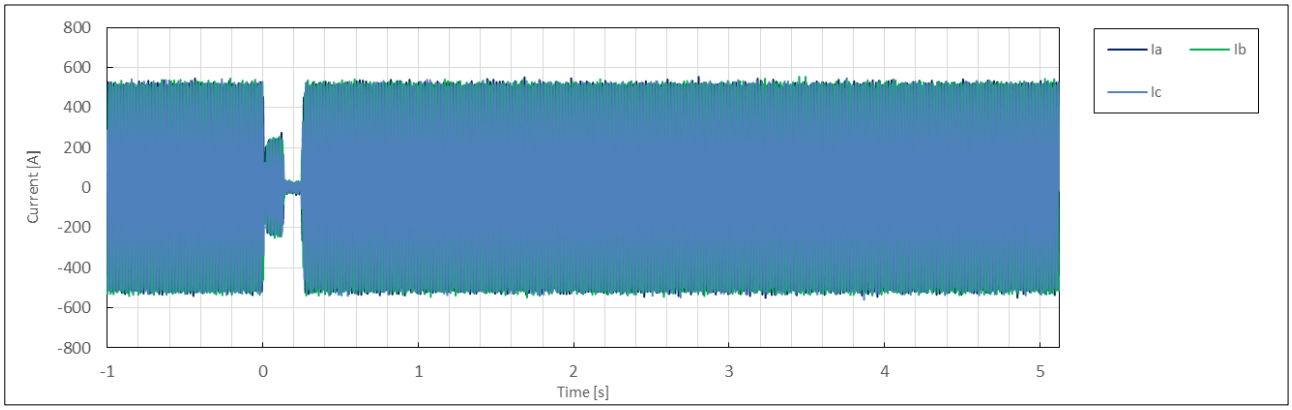
No. 8.1 Load Test

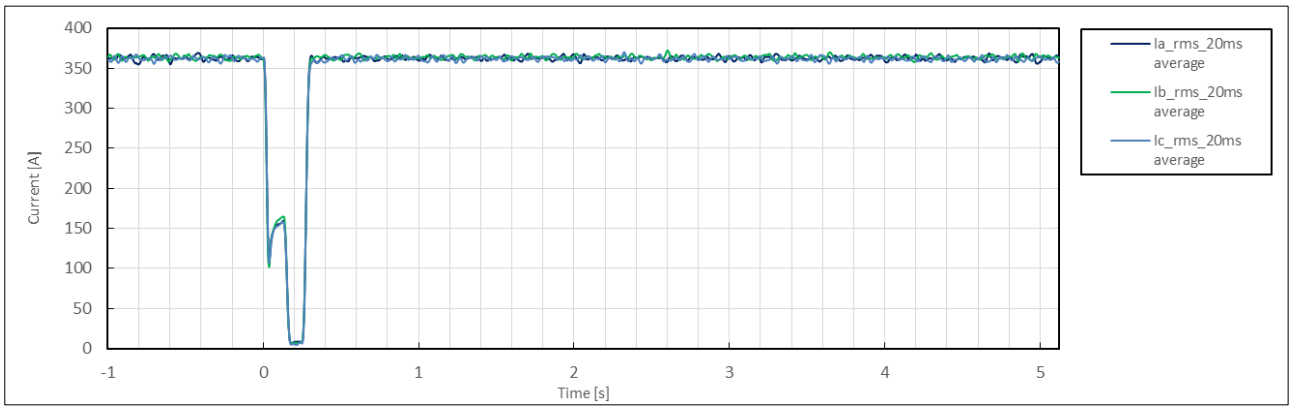


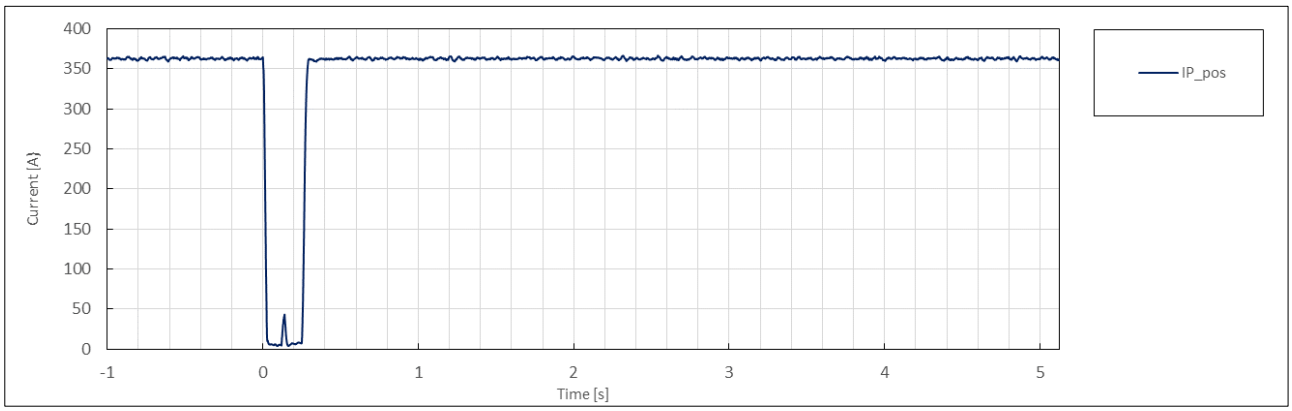


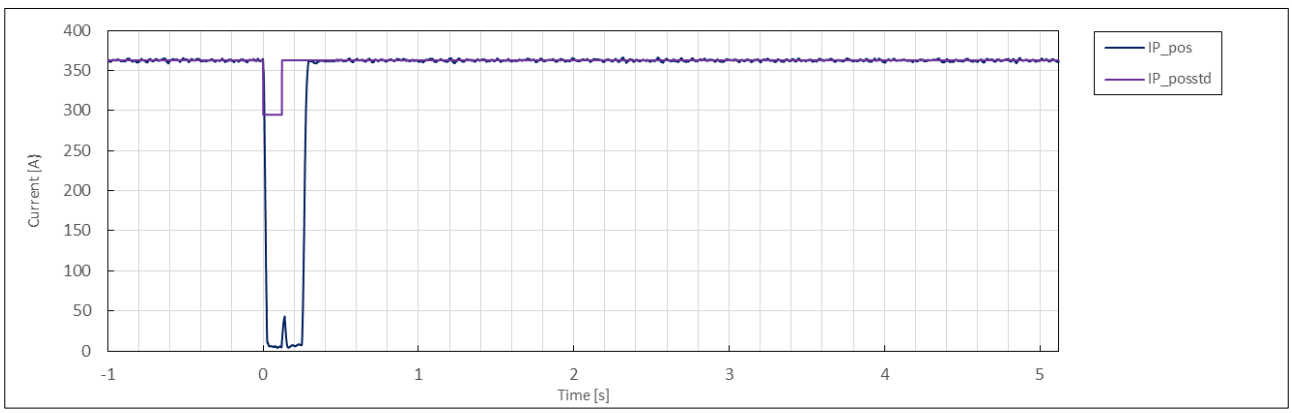


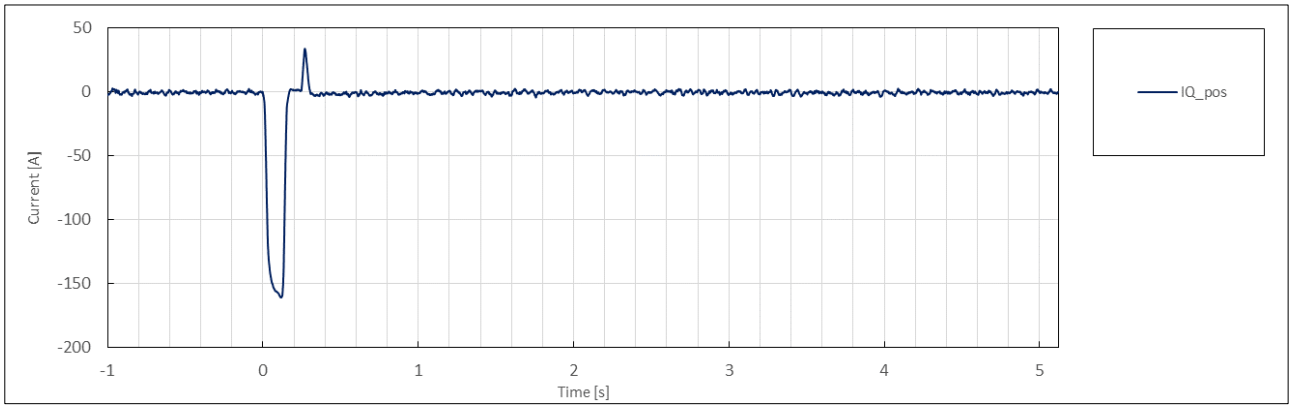


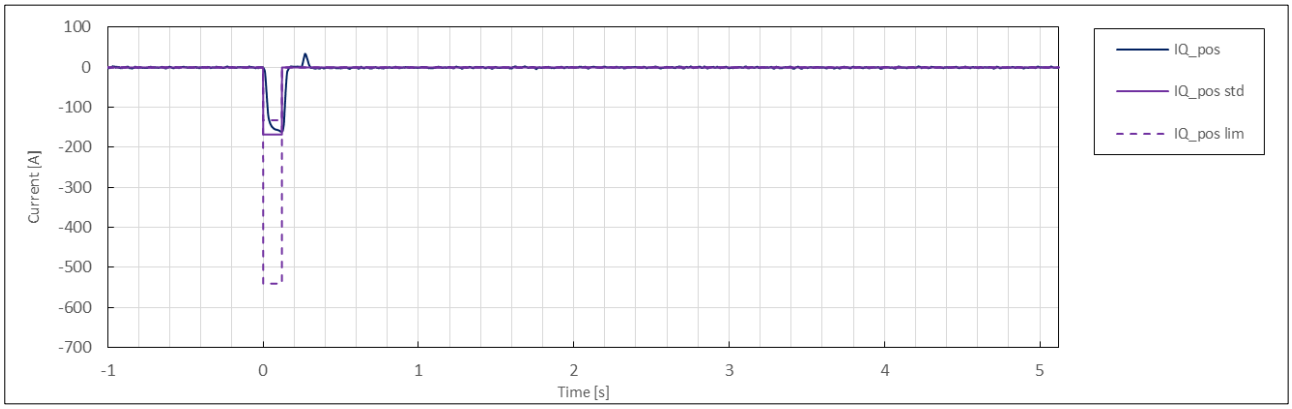

800
600
400
200
0
-200
-400
-600
-800
Current [A]
-1
0
1
2
3
4
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Time [s]
Ia
Ib
Ic

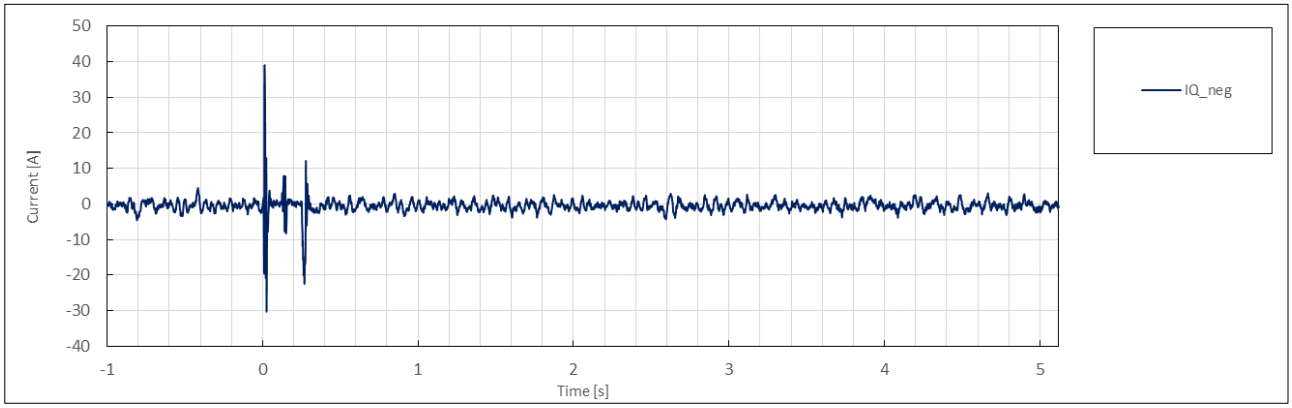

400
350
300
250
200
150
100
50
0
Current [A]
-1
0
1
2
3
4
5
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

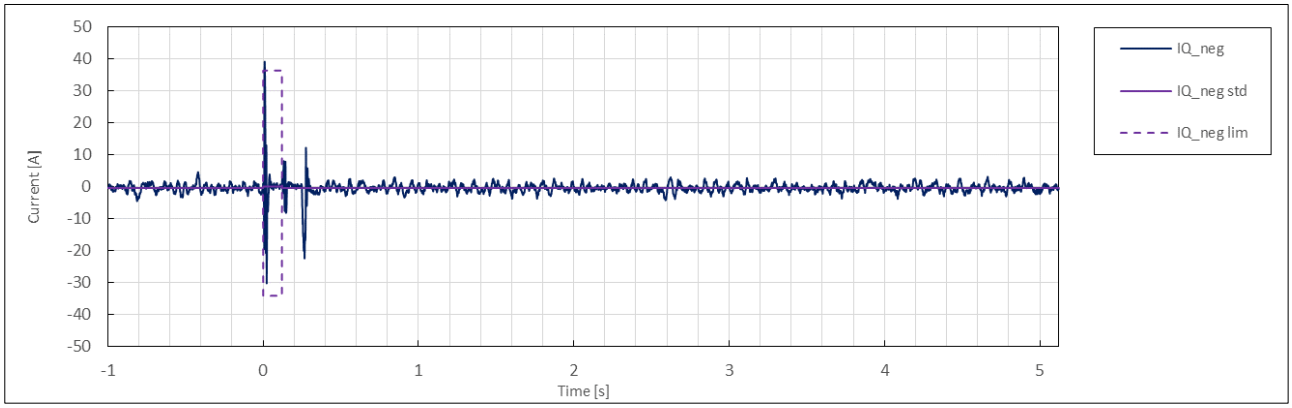

400
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300
250
200
150
100
50
0
Current [A]
-1
0
1
2
3
4
5
Time [s]
IP_pos

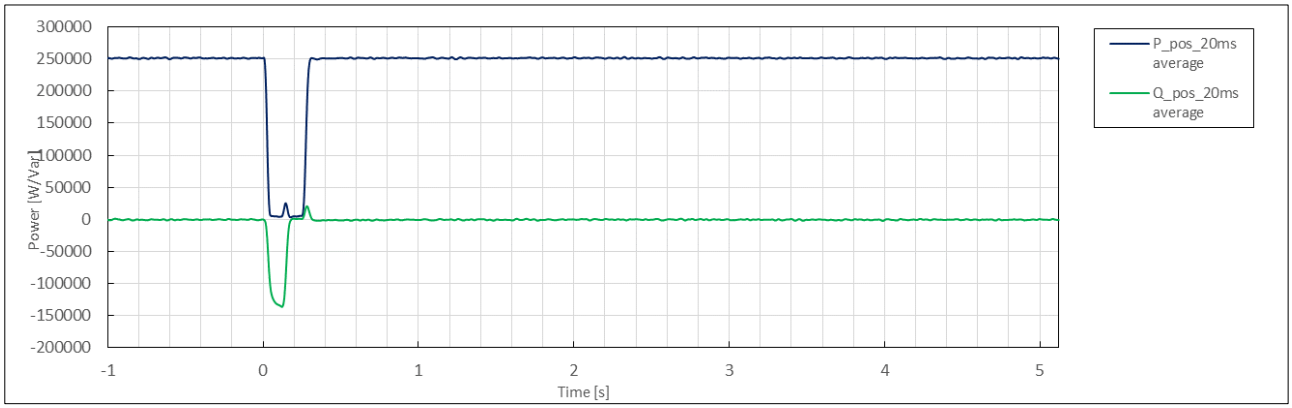

400
350
300
250
200
150
100
50
0
Current [A]
-1
0
1
2
3
4
5
Time [s]
IP_pos
IP_posstd


50
0
-50
-100
-150
-200
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos

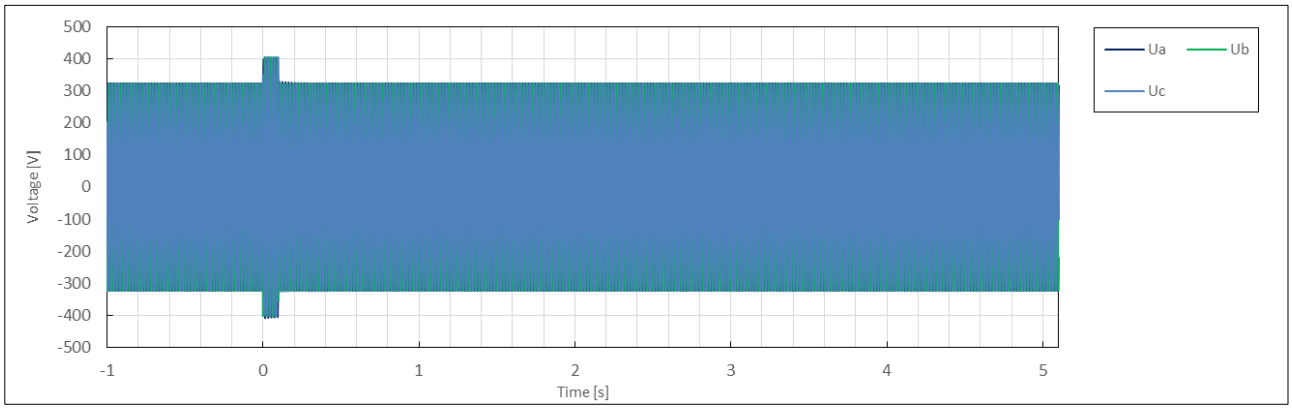

100
0
-100
-200
-300
-400
-500
-600
-700
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

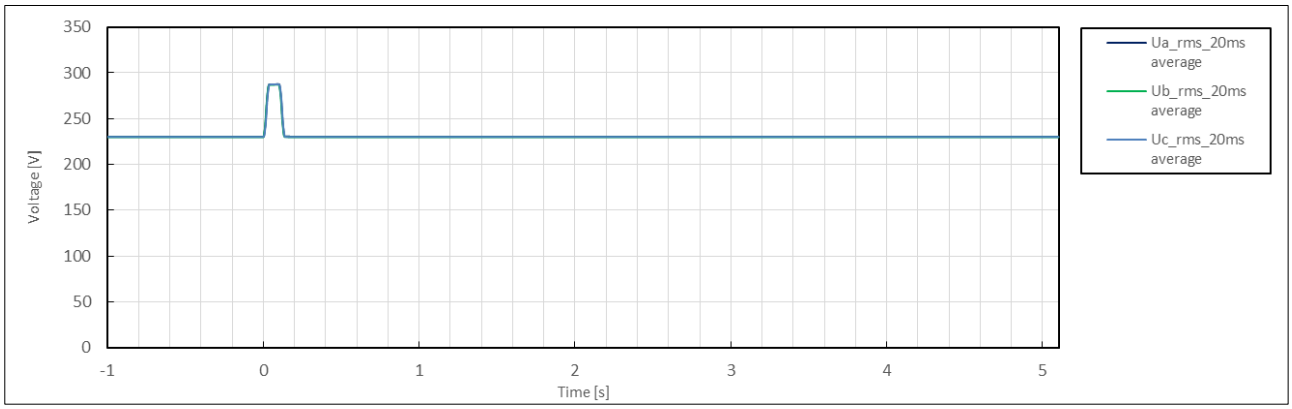

50
40
30
20
10
0
-10
-20
-30
-40
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg

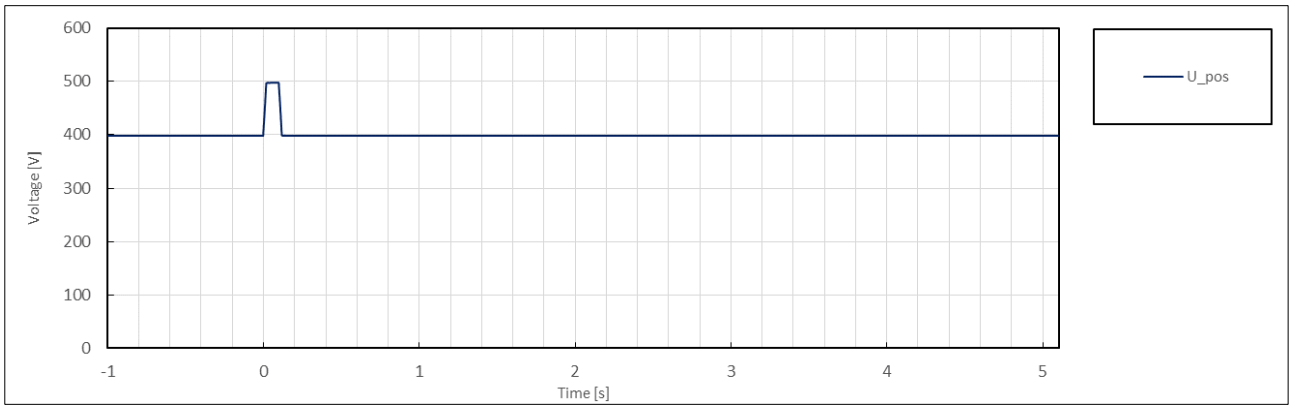

50
40
30
20
10
0
-10
-20
-30
-40
-50
Current [A]
-1
0
1
2
3
4
5
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
-150000
-200000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

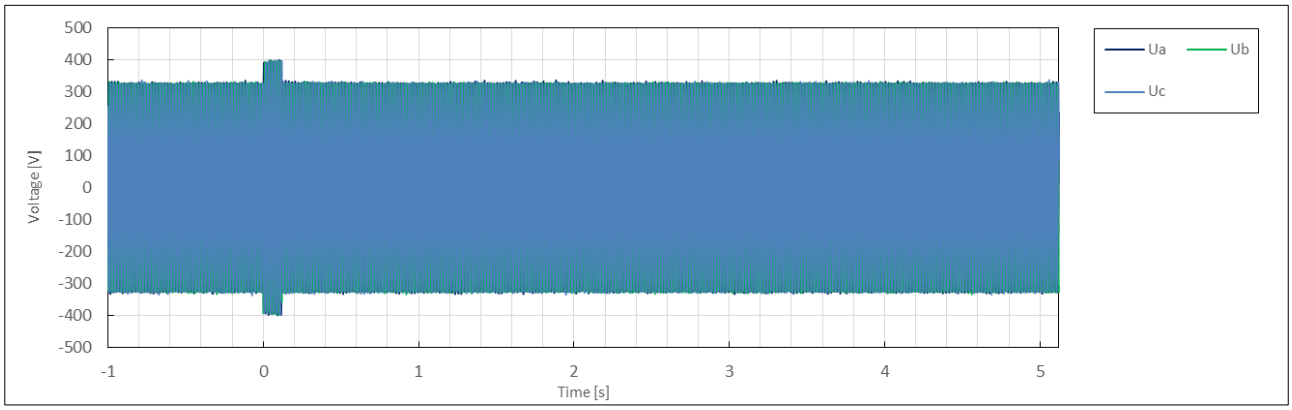
No. 8.2 Idle Test

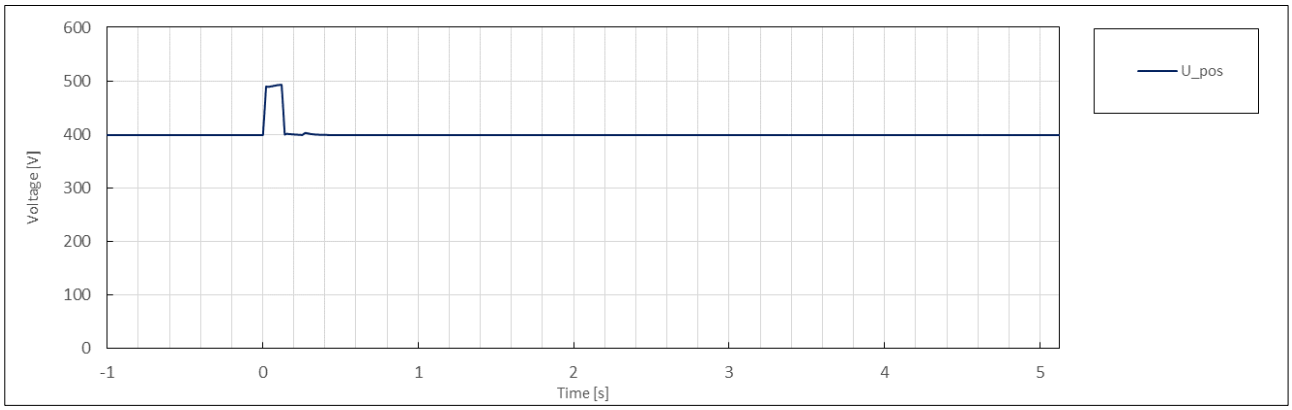


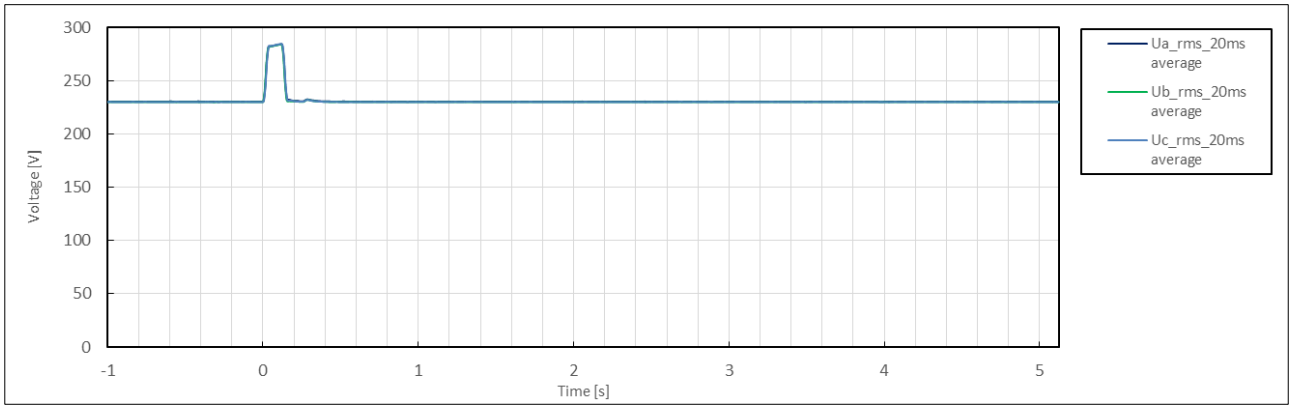


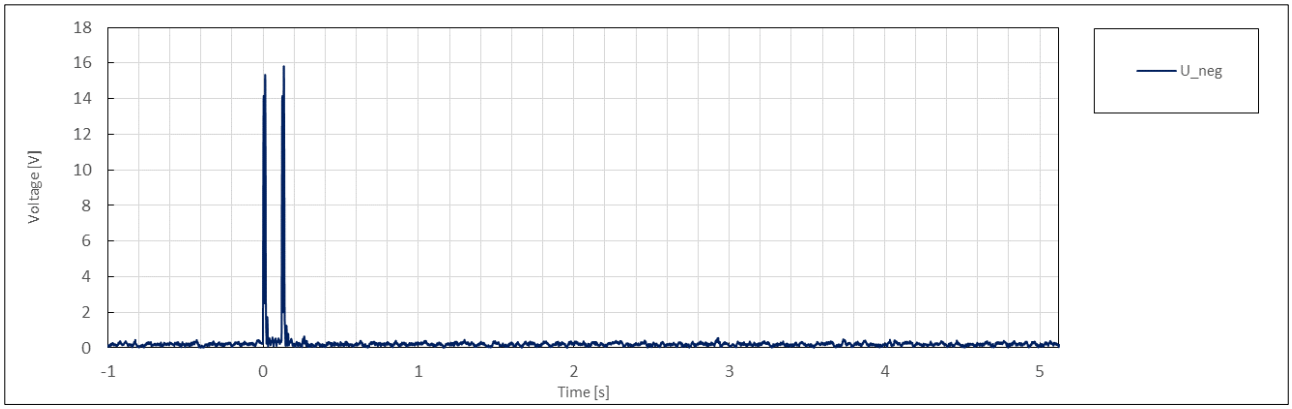


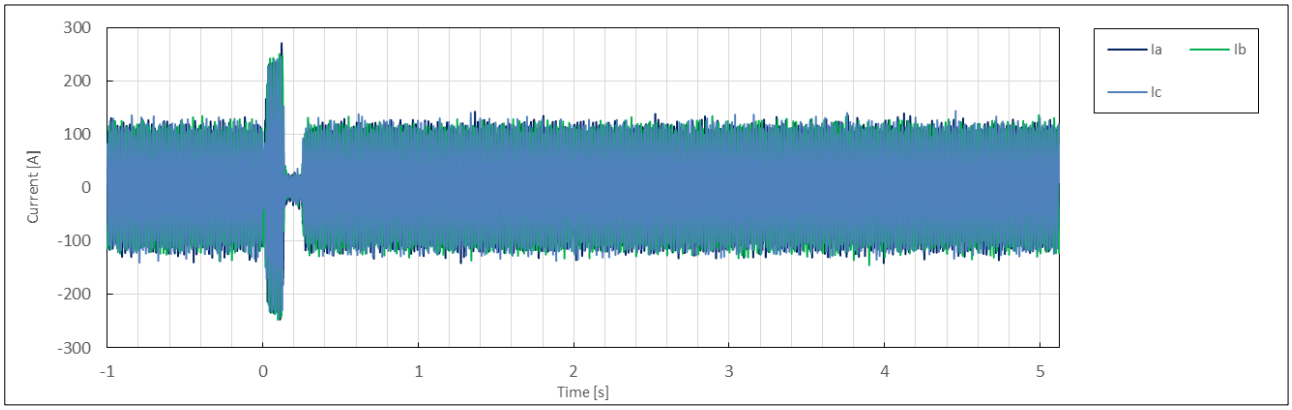
No. 8.2 Load Test

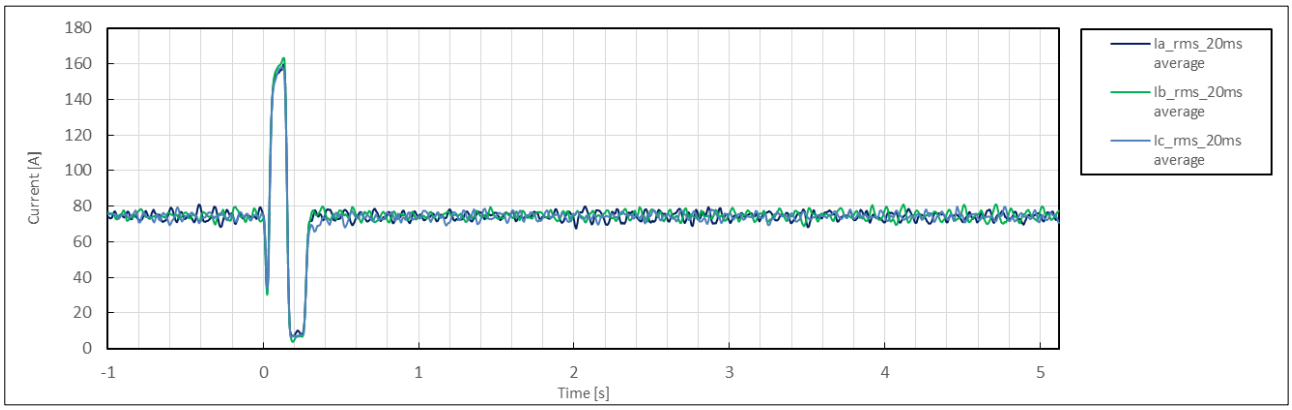


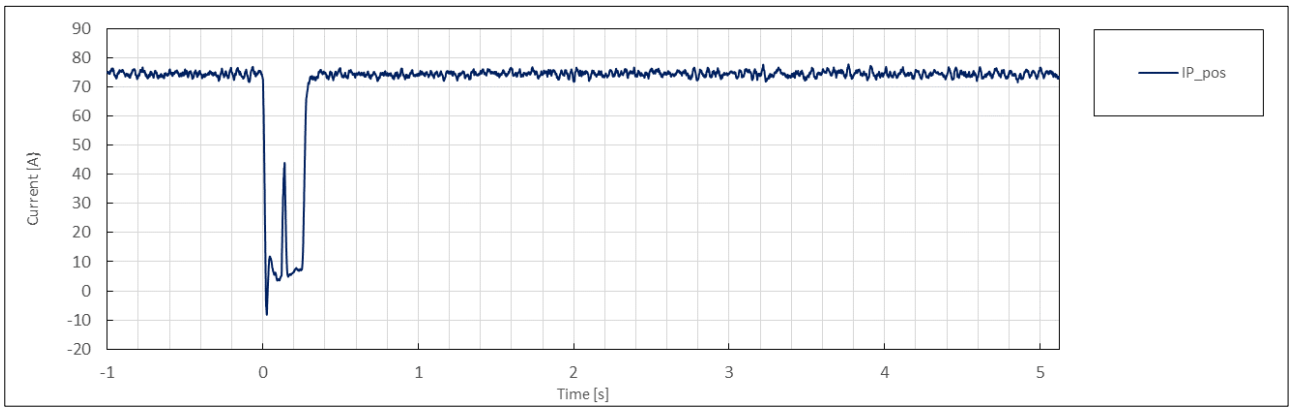


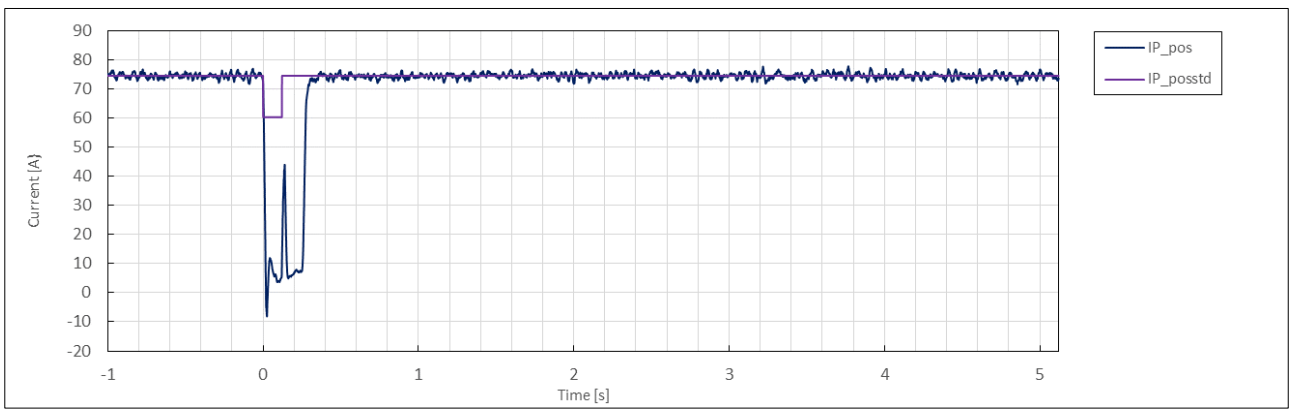


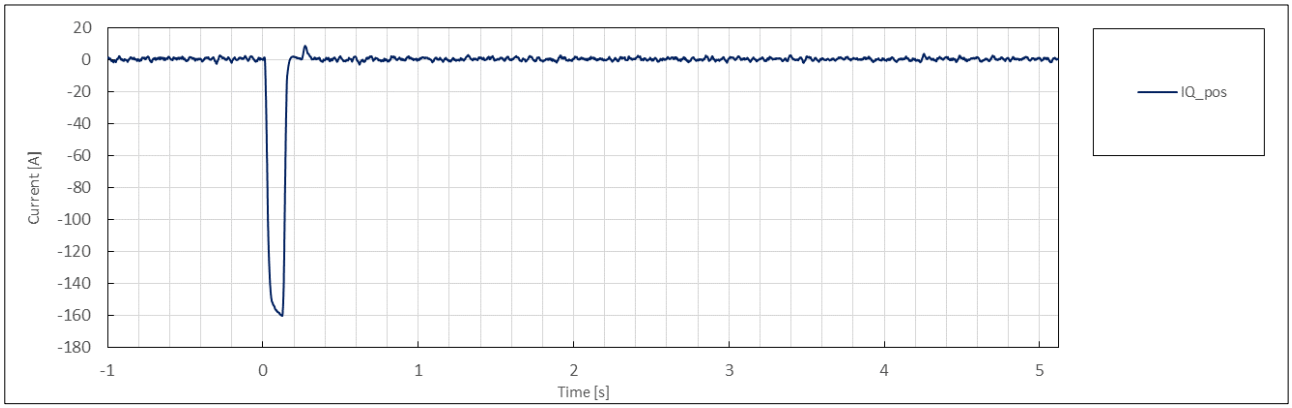


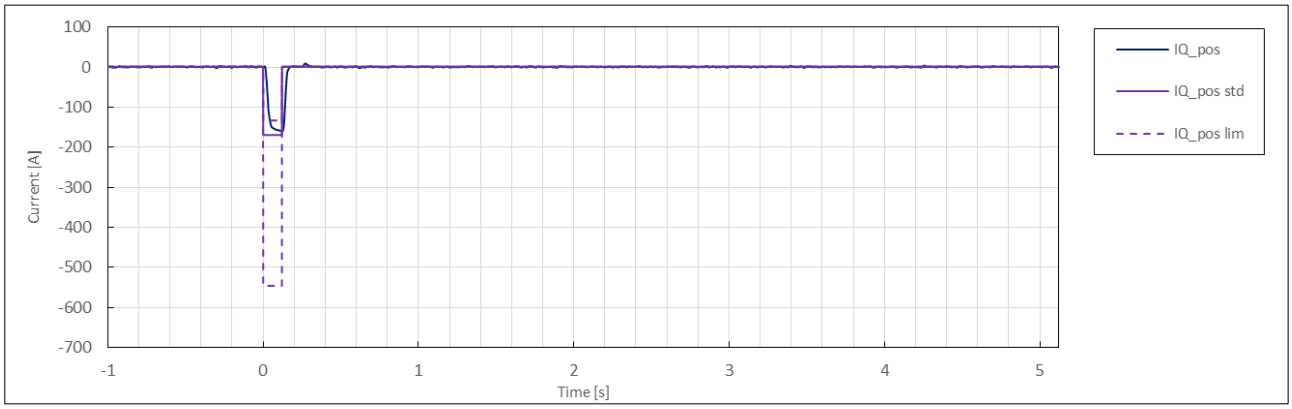

Current [A]
Time [s]
Ia
Ib
Ic

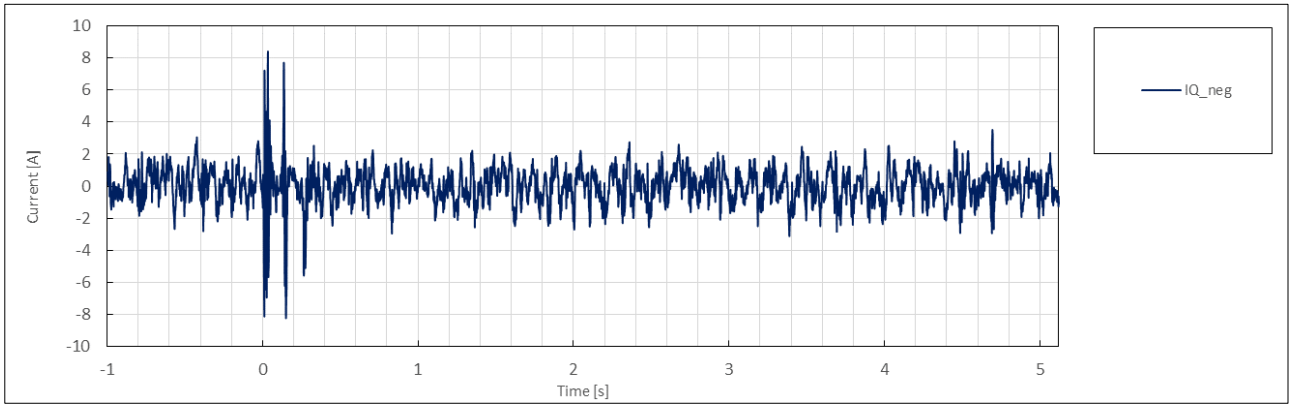

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

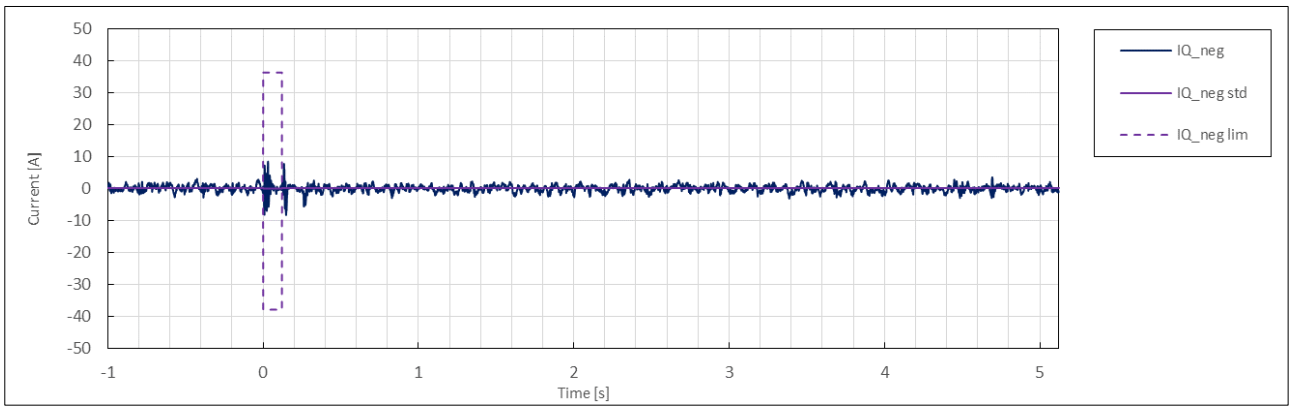

Current [A]
Time [s]
IP_pos

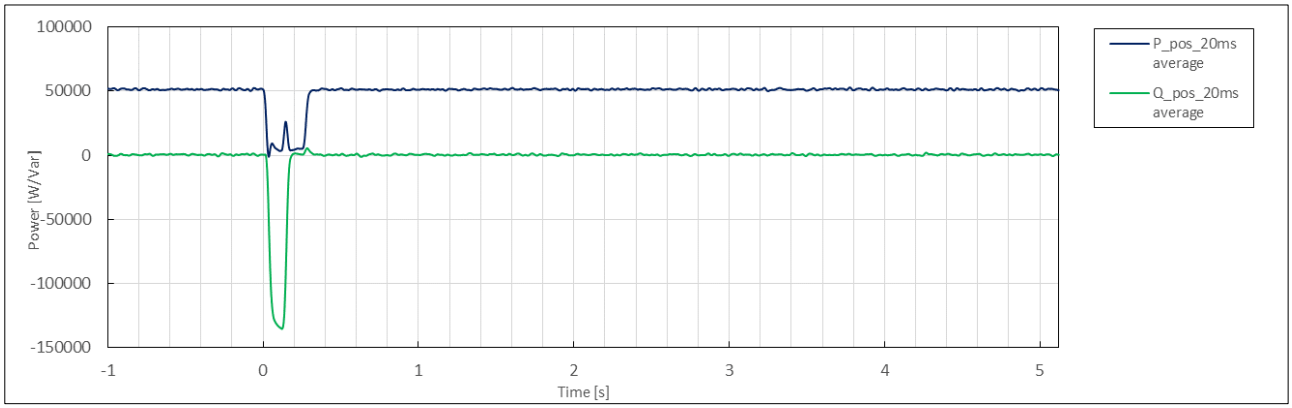

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

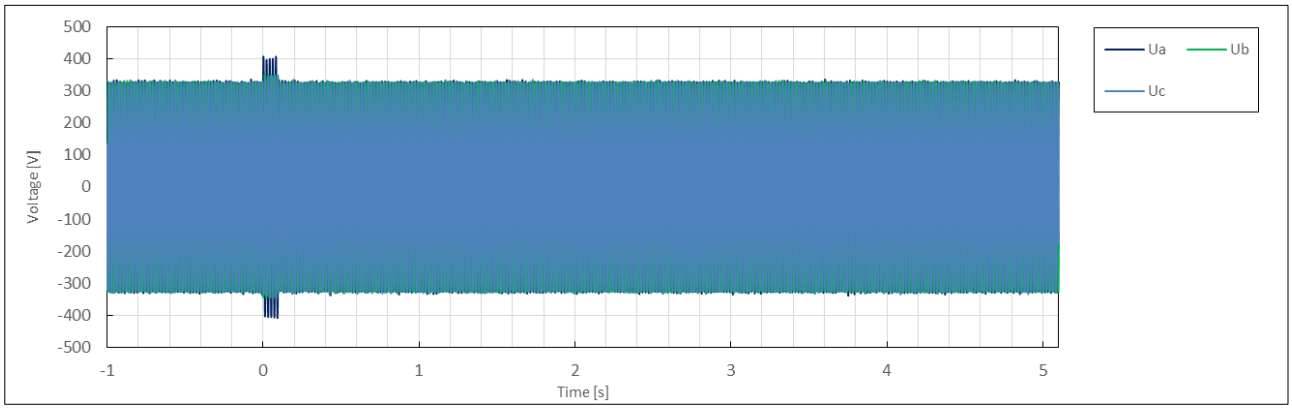

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

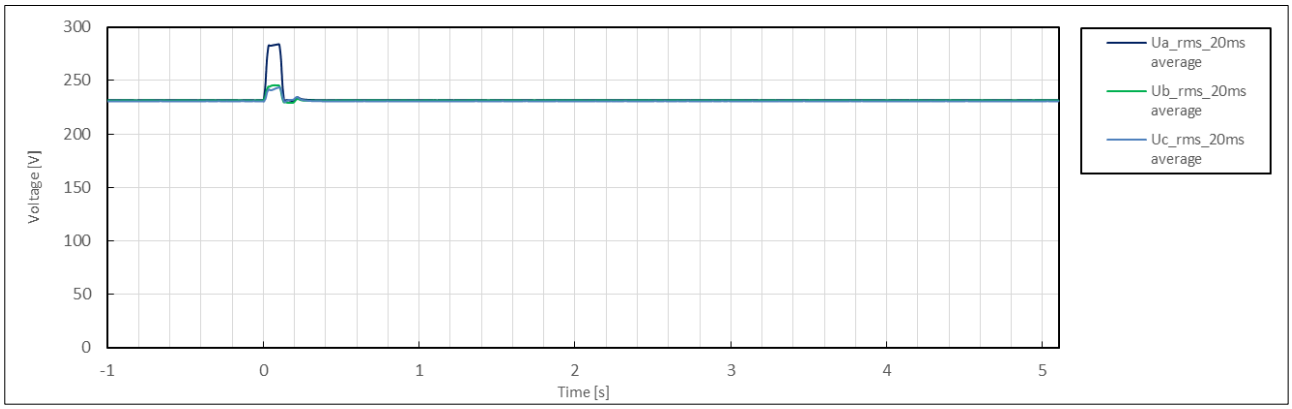

Current [A]
Time [s]
IQ_neg

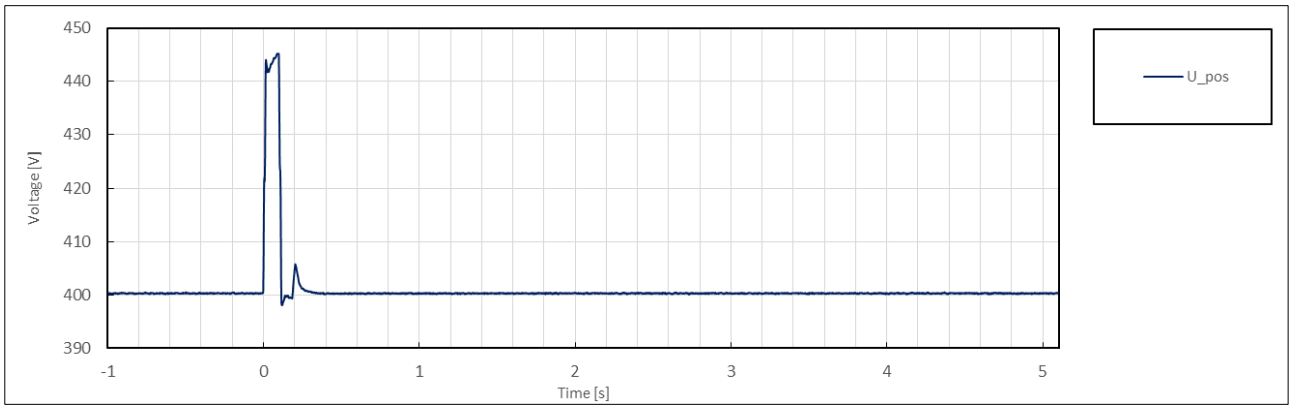

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


100000
50000
0
-50000
-100000
-150000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

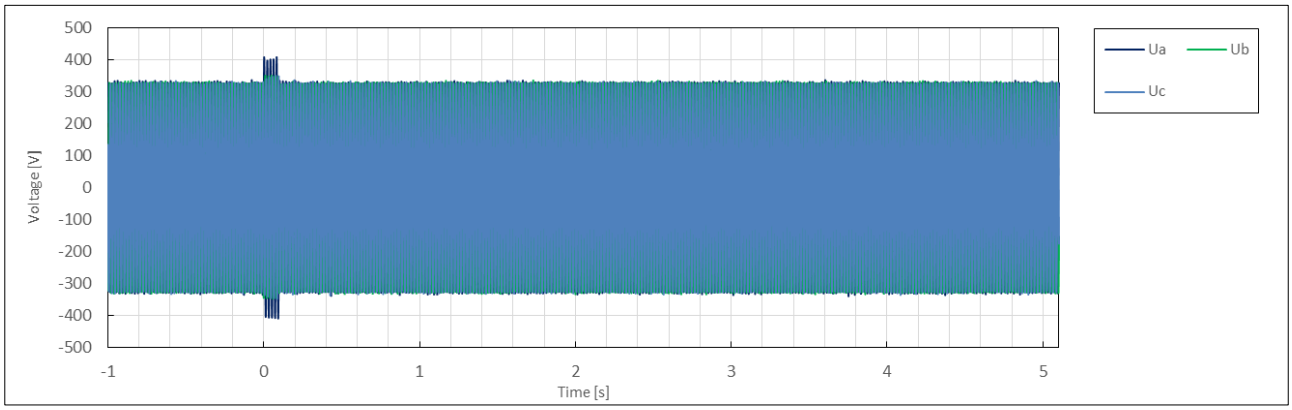
No. 8.3 Idle Test

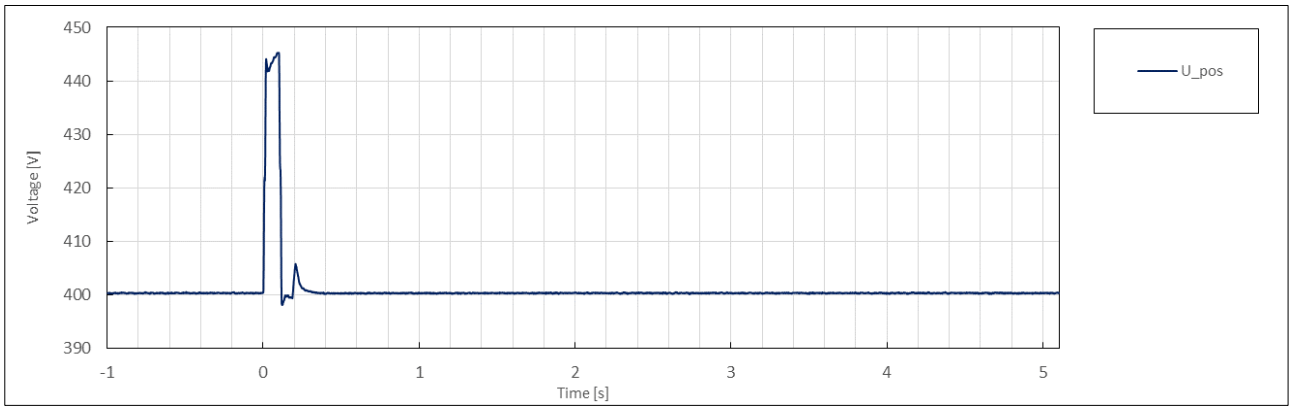


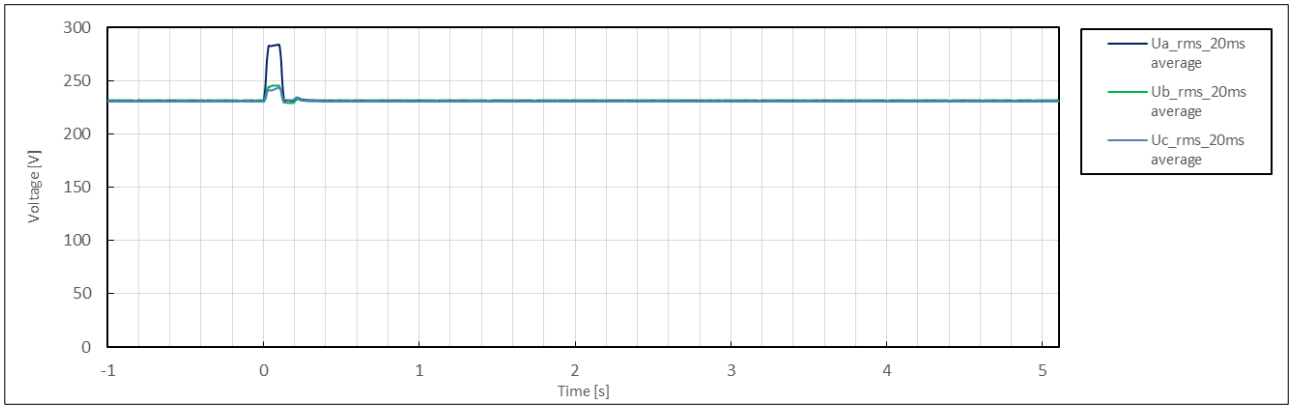


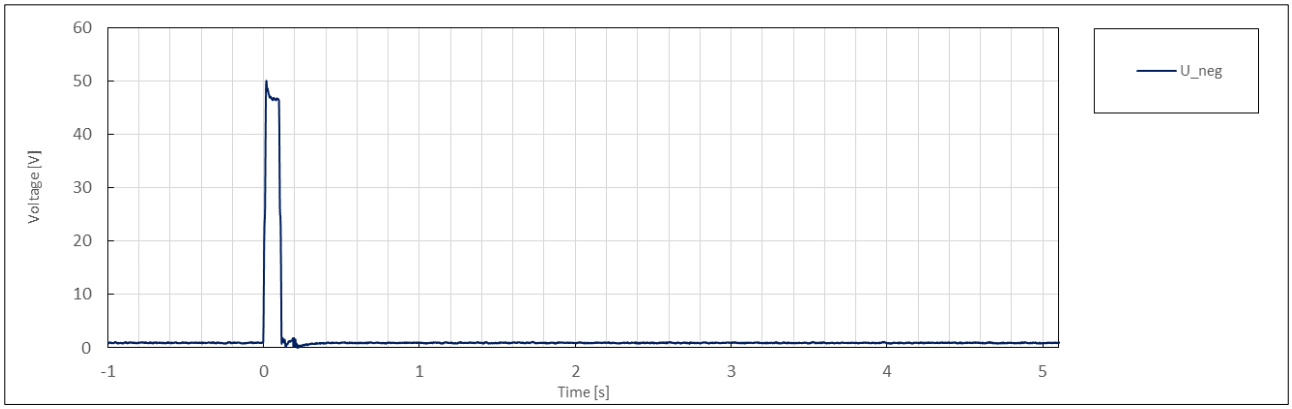


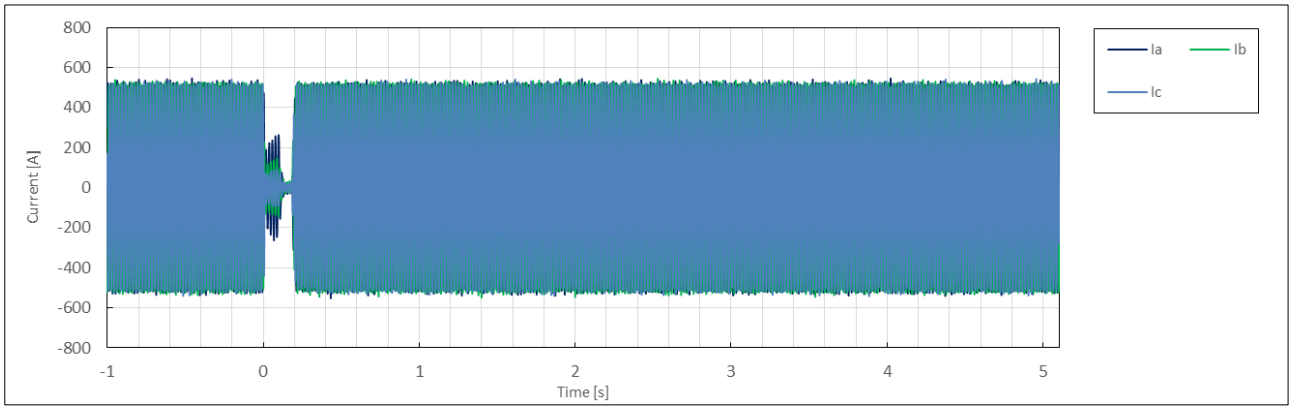
No. 8.3 Load Test

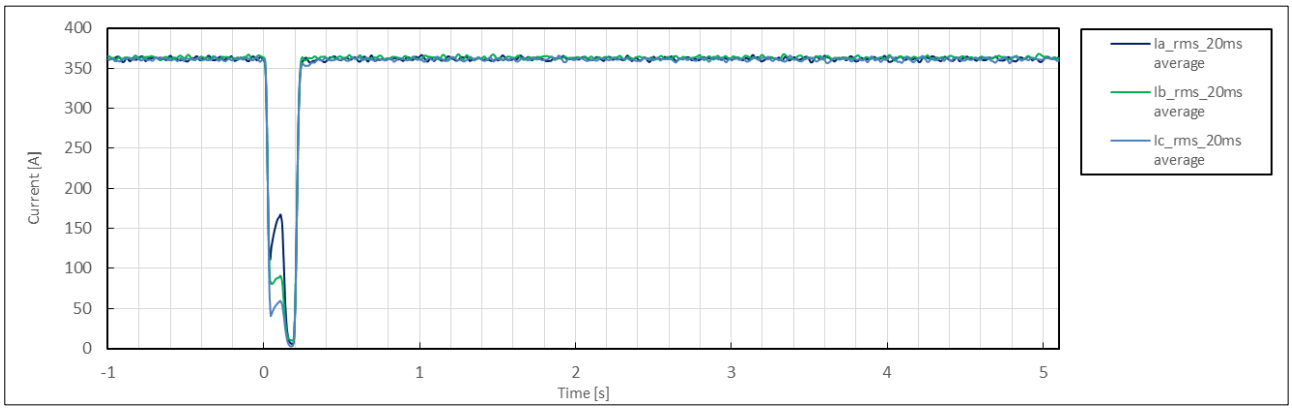


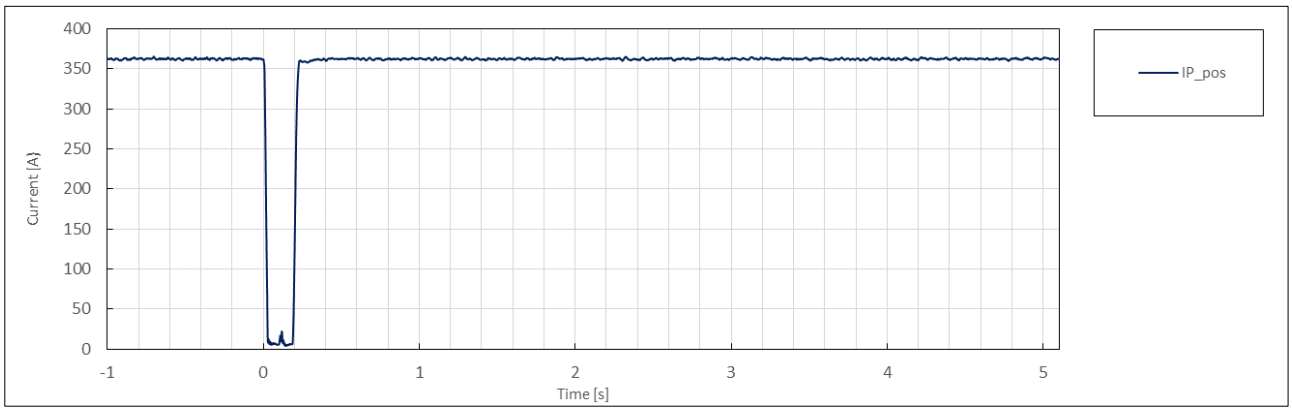


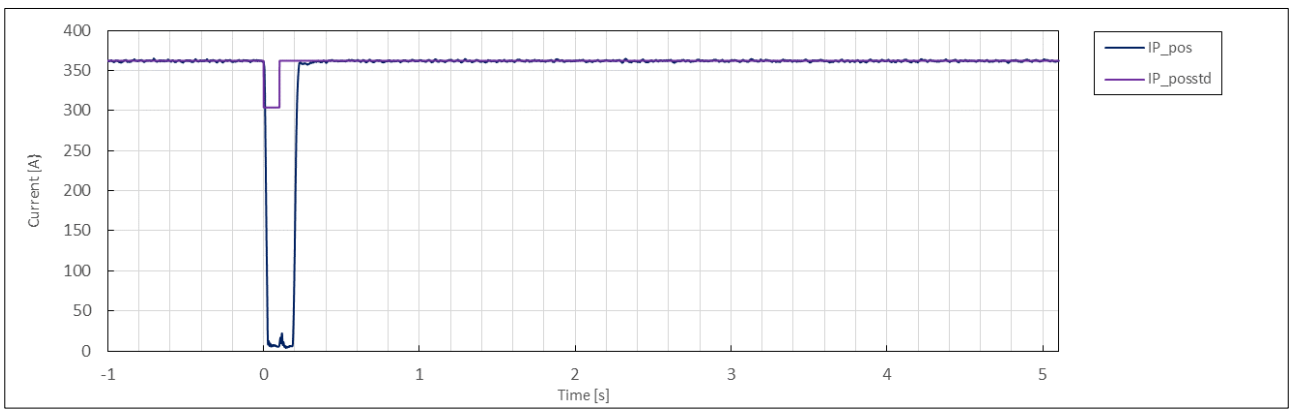


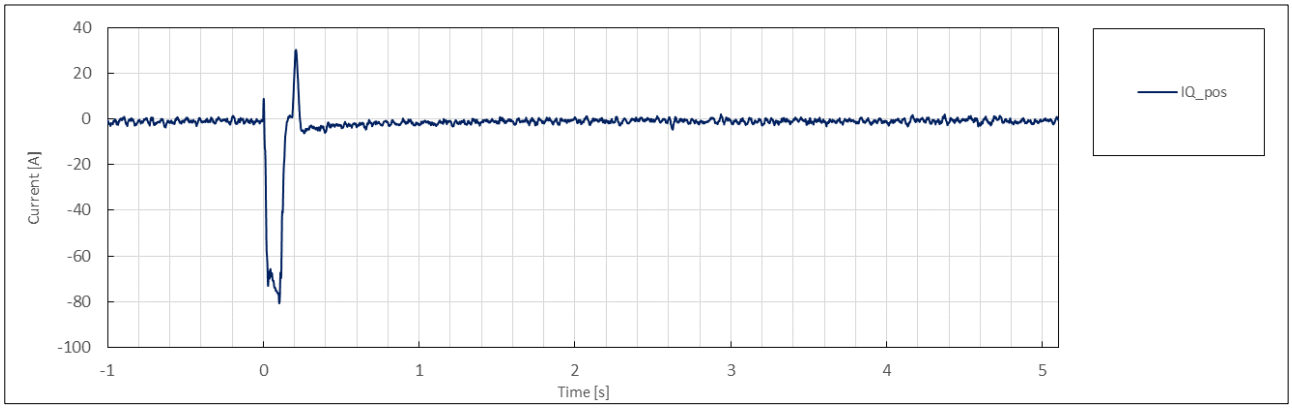


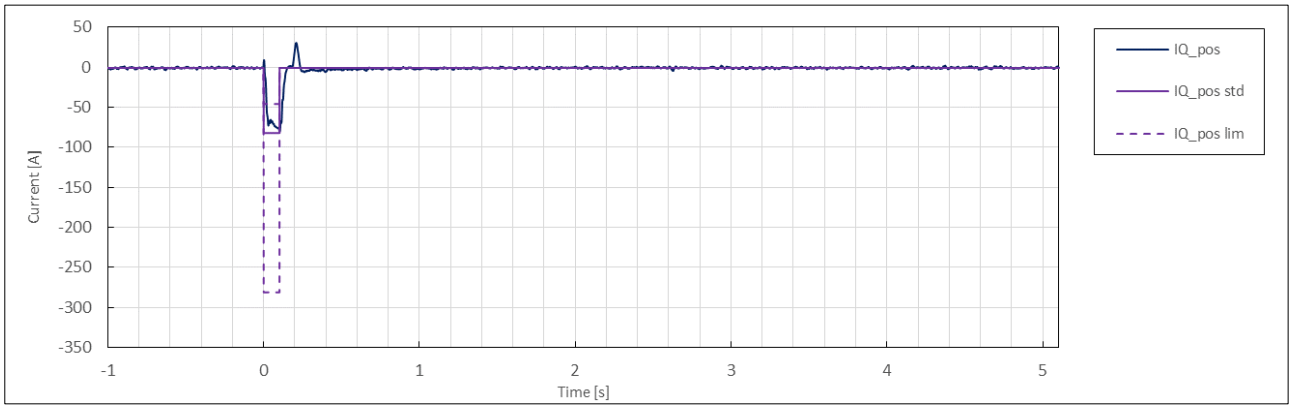

Current [A]
Time [s]
Ia
Ib
Ic

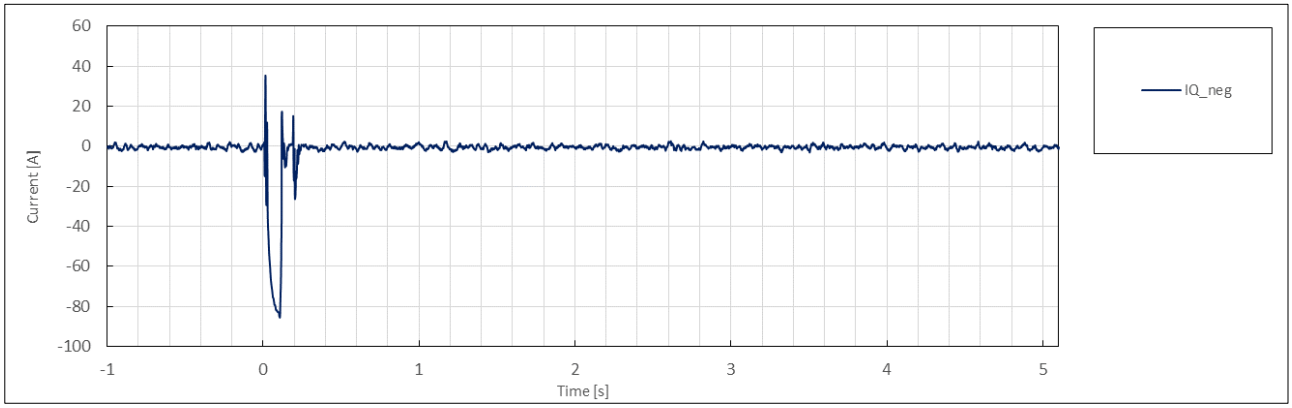

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

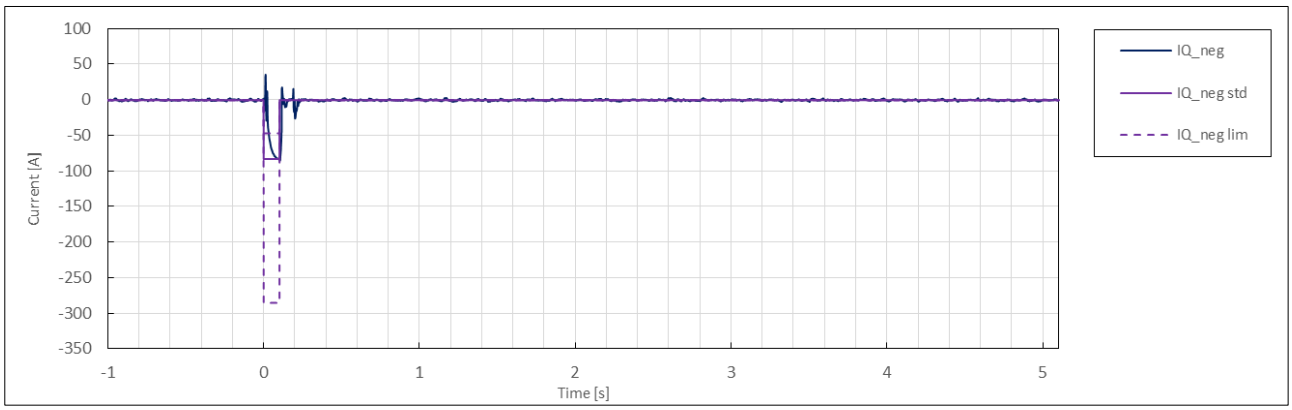

Current [A]
Time [s]
IP_pos

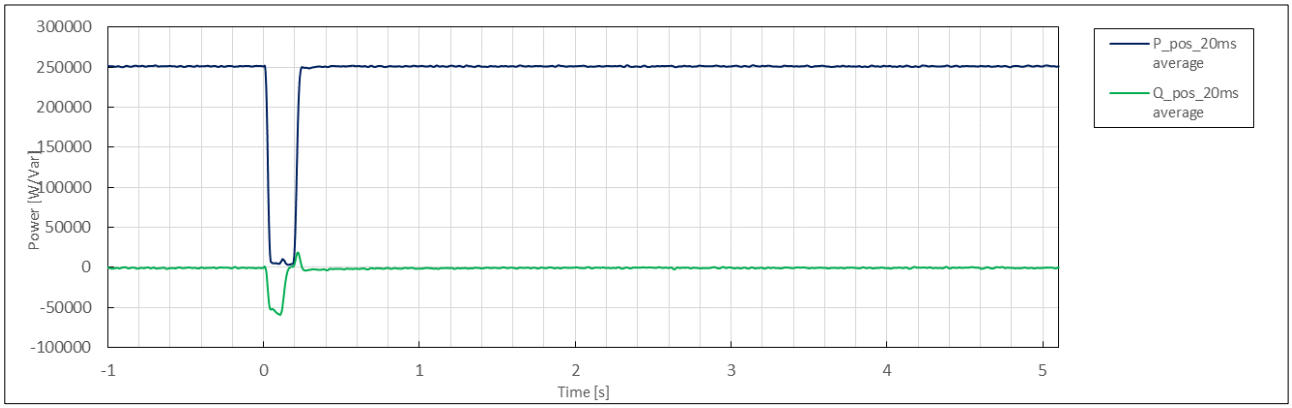

Current [A]
Time [s]
IP_pos
IP_posstd


Current [A]
Time [s]
IQ_pos

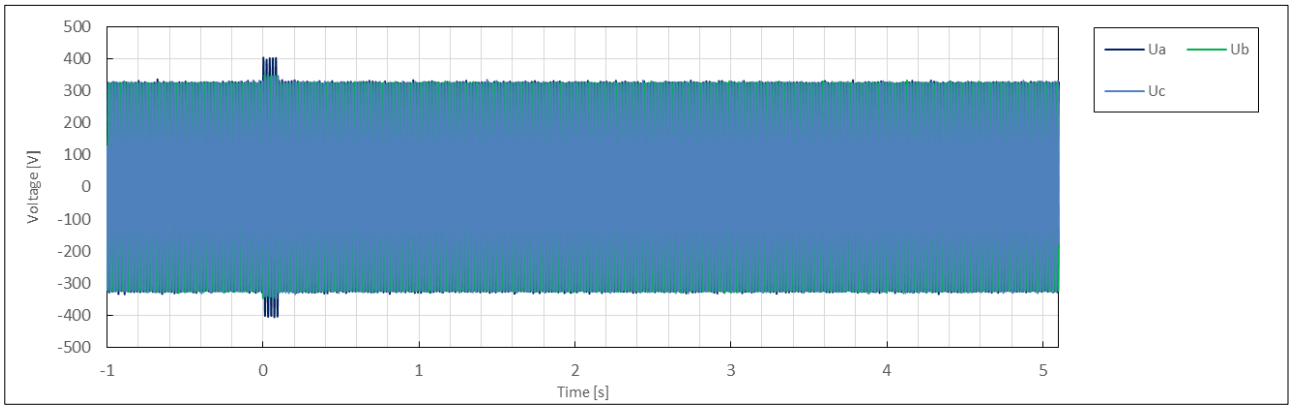

Current [A]
Time [s]
IQ_pos
IQ_pos std
IQ_pos lim

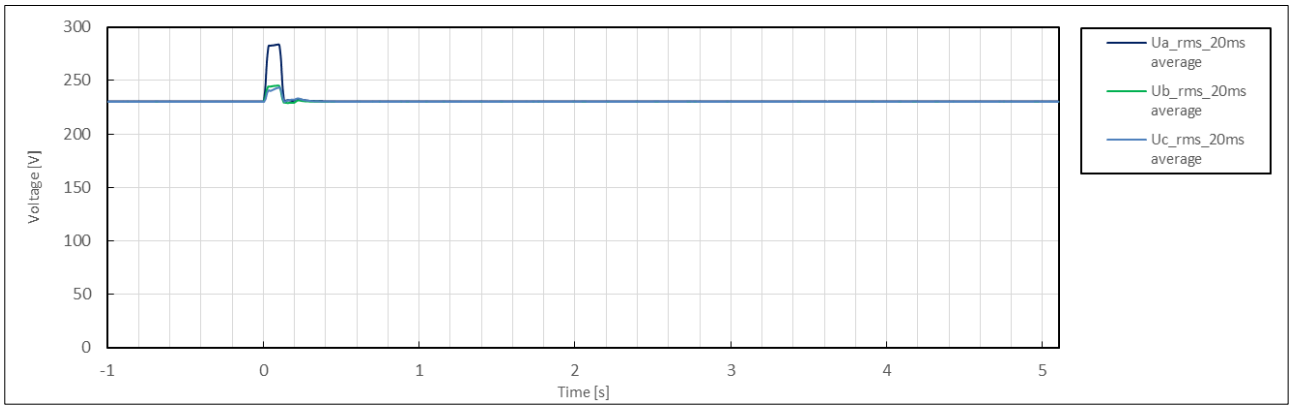

Current [A]
Time [s]
IQ_neg

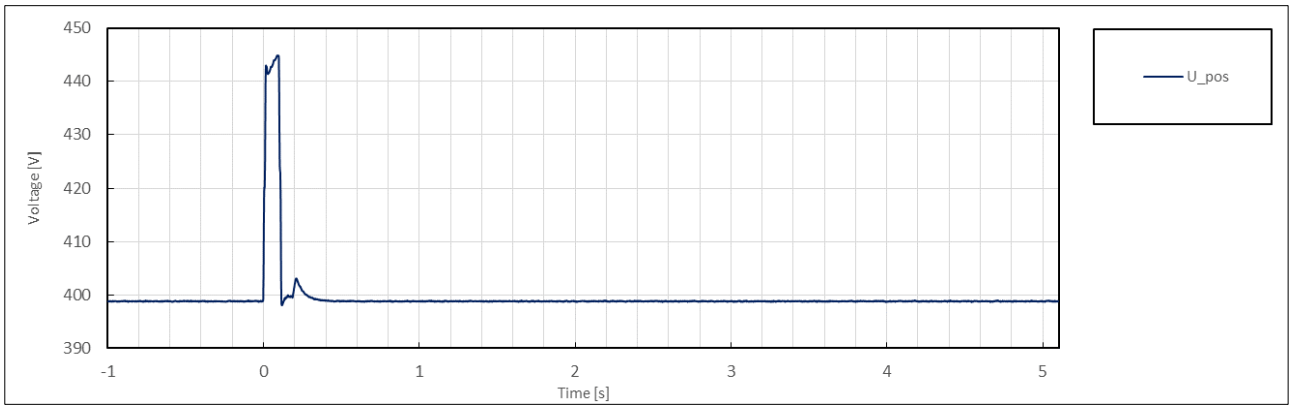

Current [A]
Time [s]
IQ_neg
IQ_neg std
IQ_neg lim


300000
250000
200000
150000
100000
50000
0
-50000
-100000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

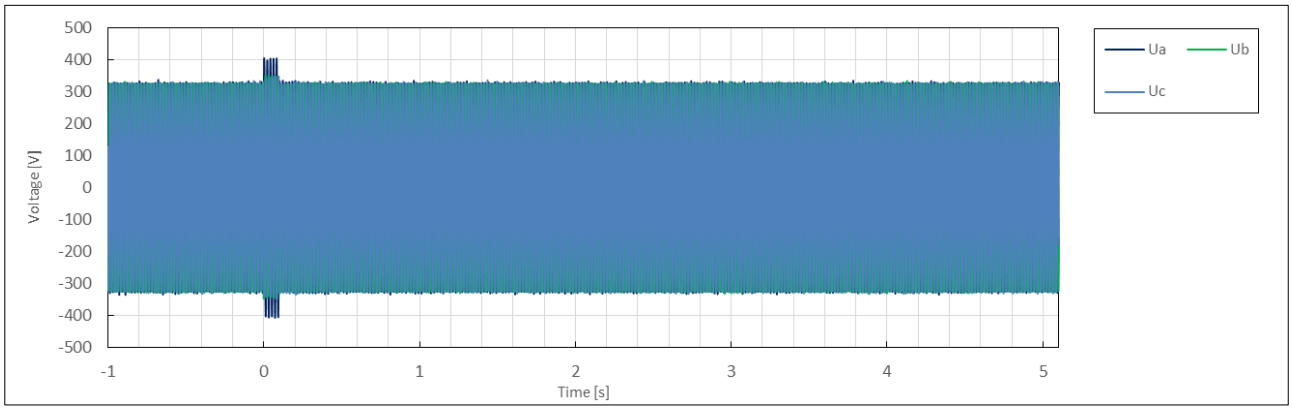
No. 8.4 Idle Test

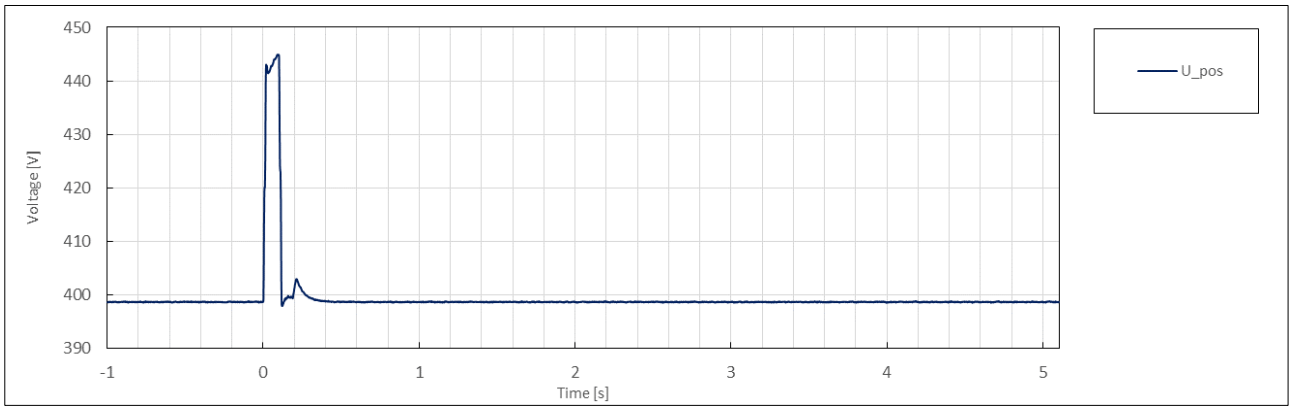


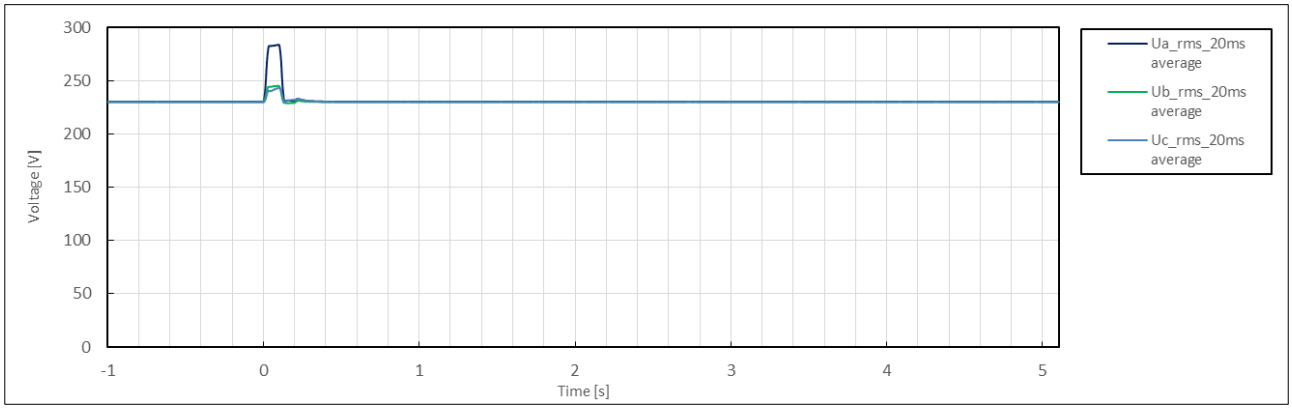


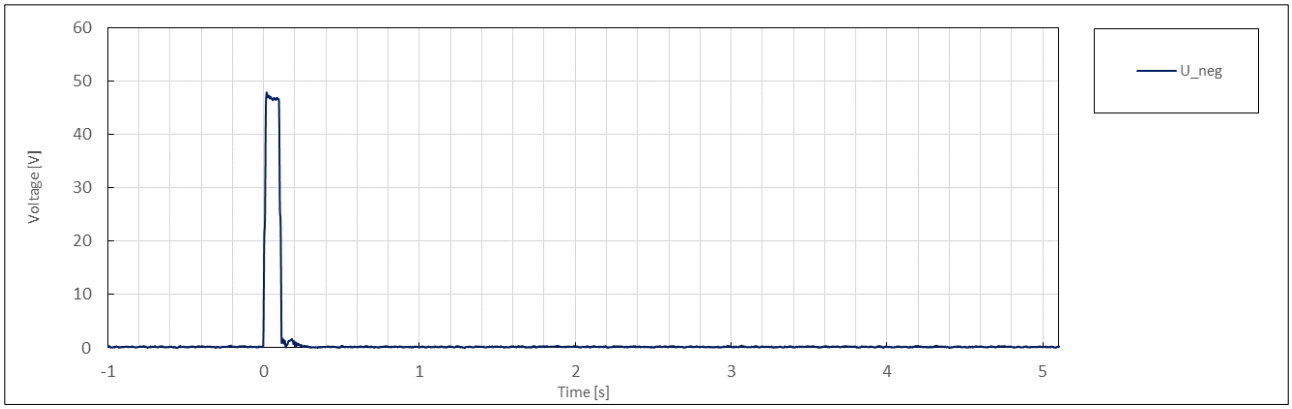


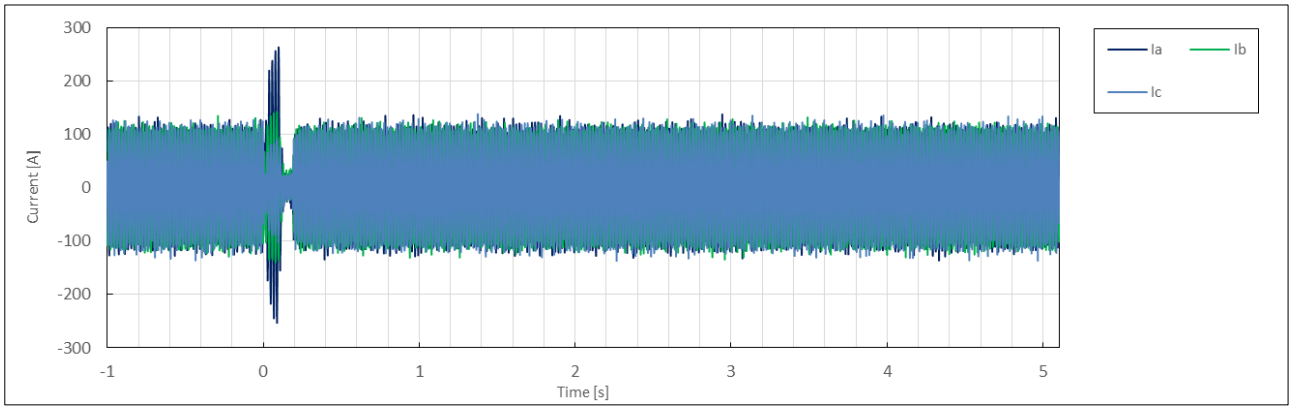
No. 8.4 Load Test

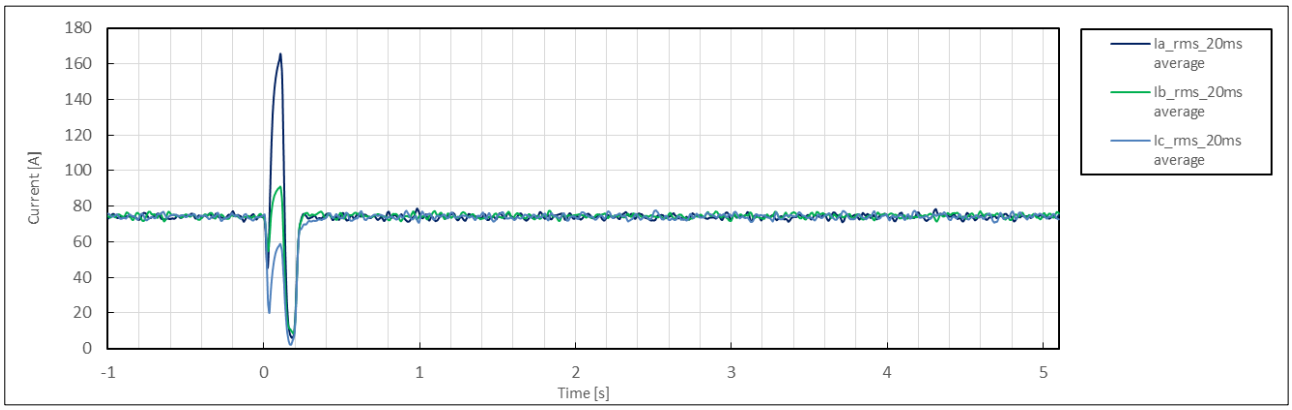


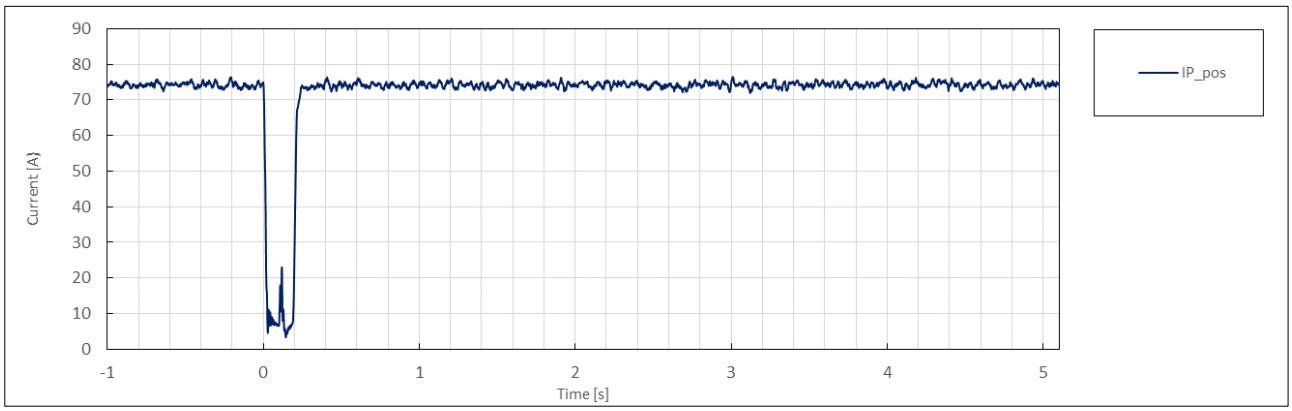


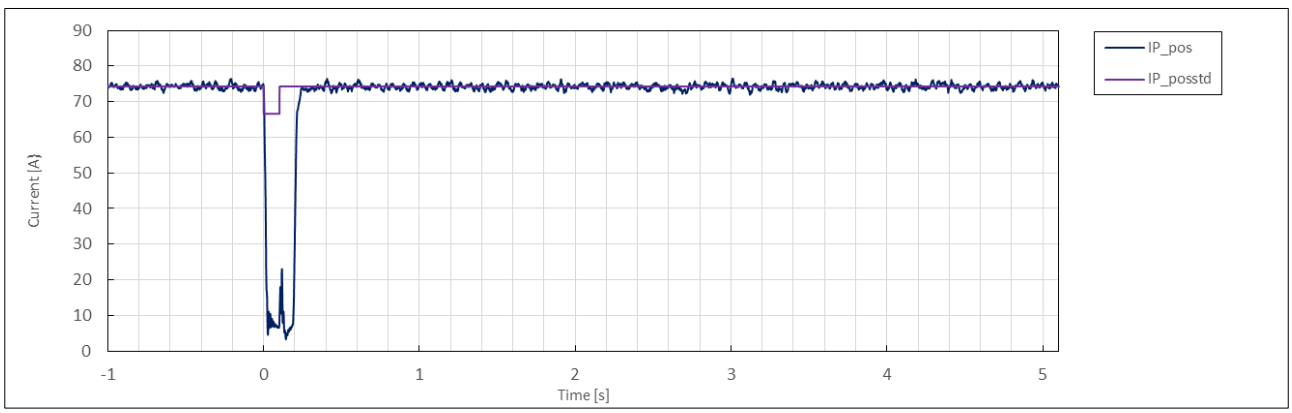


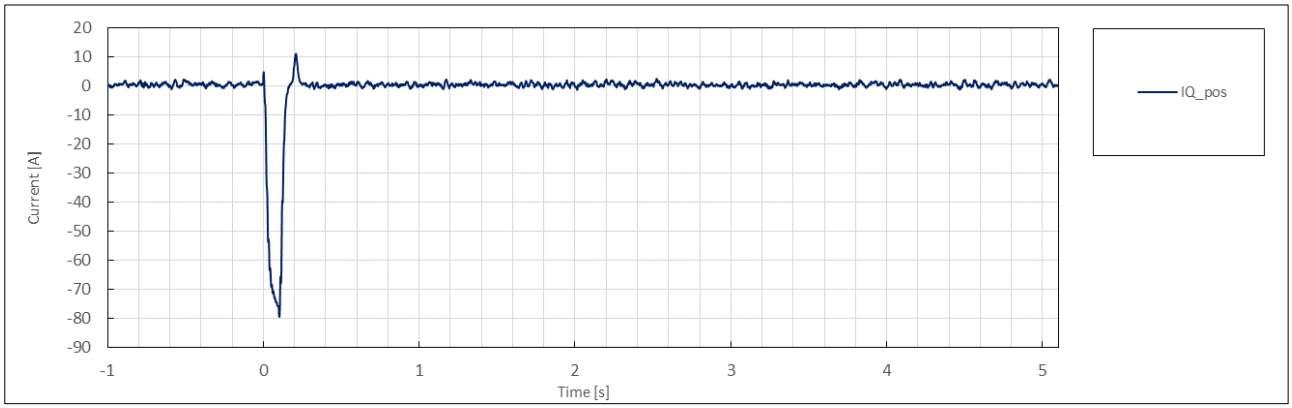


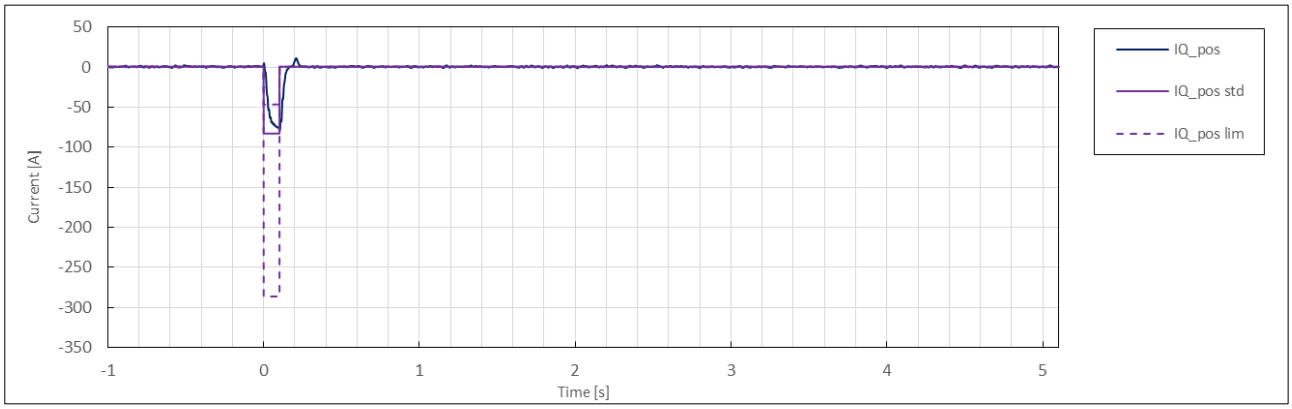

Current [A]
Time [s]
Ia
Ib
Ic

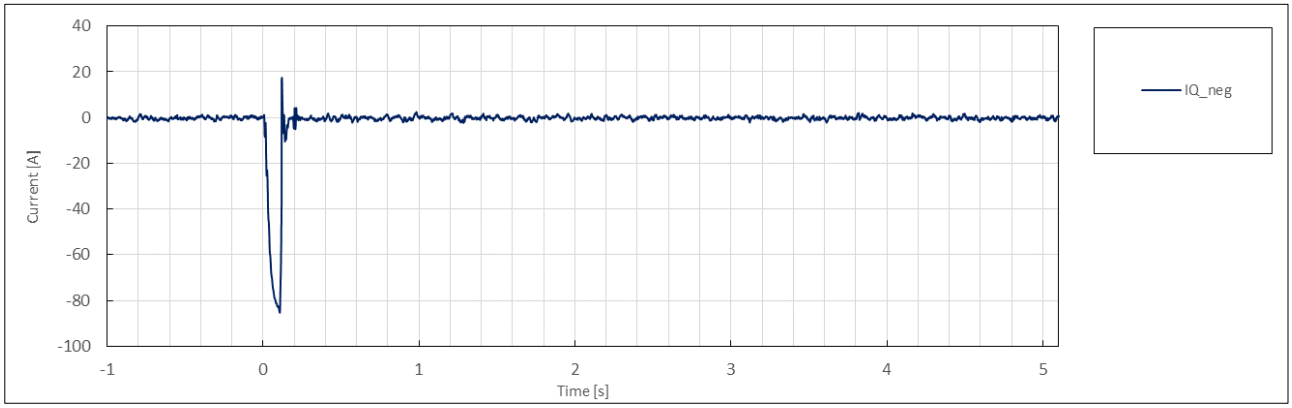

Current [A]
Time [s]
Ia_rms_20ms average
Ib_rms_20ms average
Ic_rms_20ms average

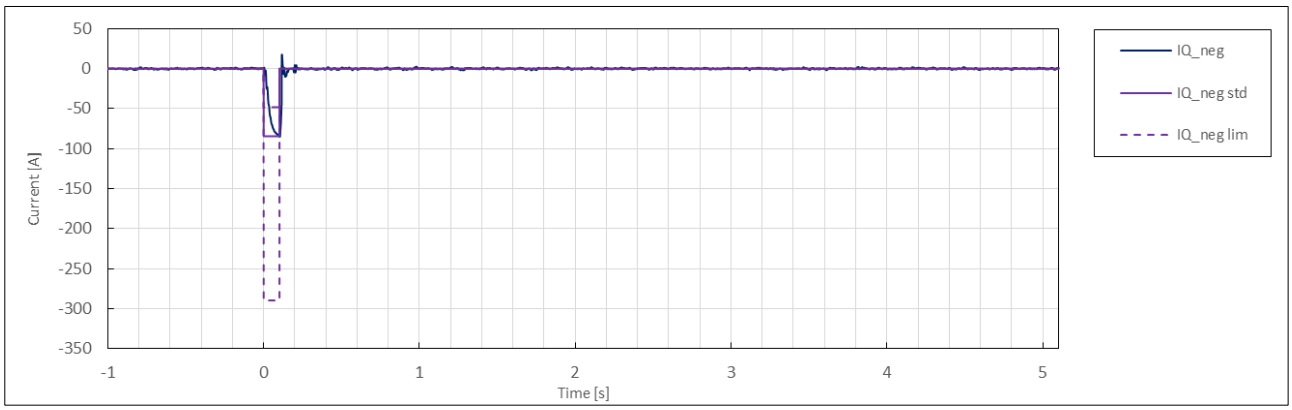

Current [A]
Time [s]
IP_pos

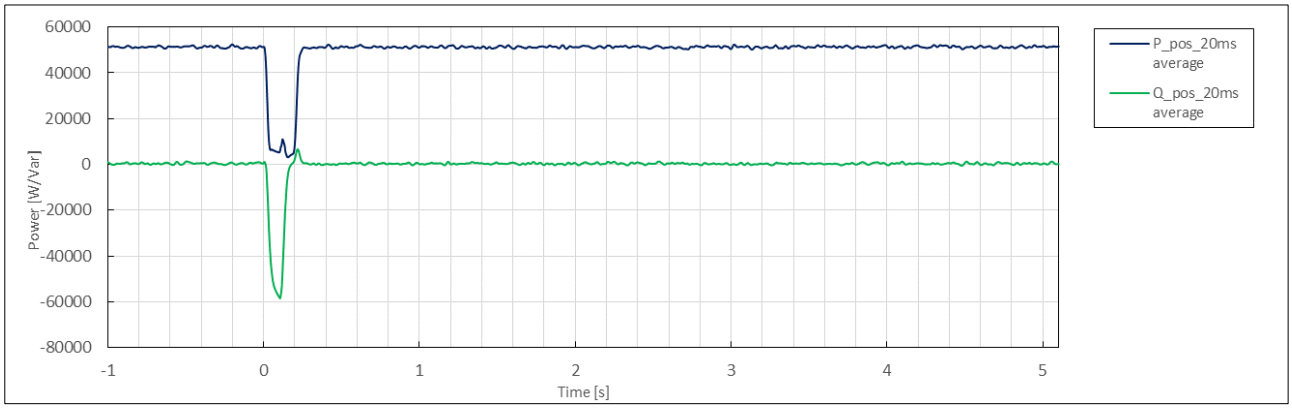

Current [A]
Time [s]
IP_pos
IP_posstd


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

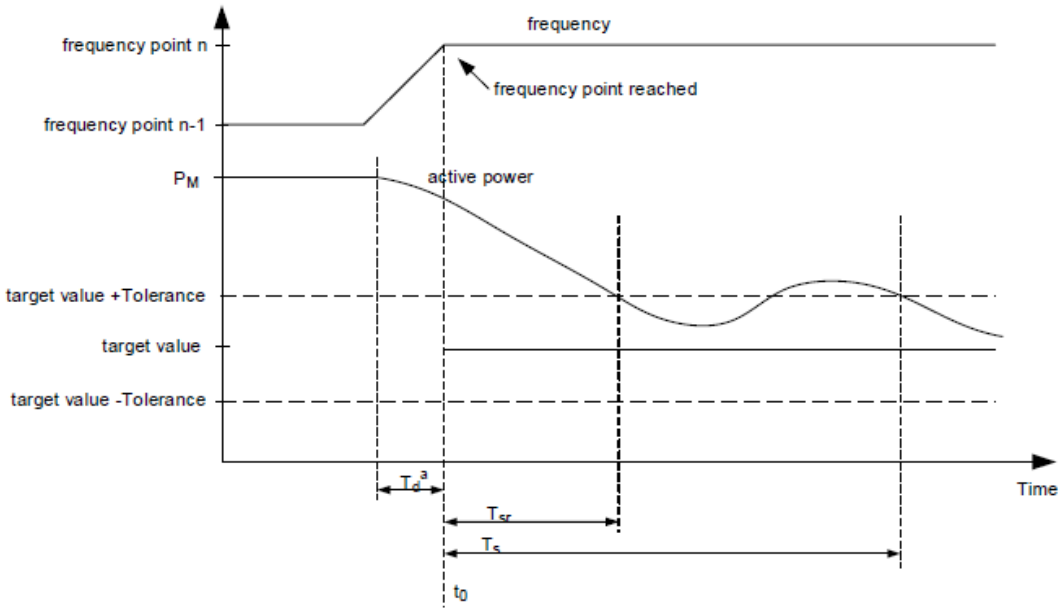

60000
40000
20000
0
-20000
-40000
-60000
-80000
Power [W/Var]
-1
0
1
2
3
4
5
Time [s]
P_pos_20ms average
Q_pos_20ms average

5.4.3.2	TABLE: Power response to over-frequencies	P

Table 6 — Frequency threshold and droop

	Setting (a)	Setting (b)	Setting (c)
frequency threshold f_{th} [Hz]	50,2	50,5	50,2
droop [%]	5	2	12
power level at start of test [% P_n]	100 / 50 [a] / –50 [d]	60 [b]	40 [c]
Intentional delay [s]	0	0	2
Configured deactivation threshold and time f_{stop} [Hz] / t_{stop} [s]	n.a.	50,5 / 1	50,05 / 600

[a] or minimum regulation level +35 % P_{max}, whichever is higher
[b] or minimum regulation level +25 % P_{max}, whichever is higher
[c] or minimum regulation level +15 % P_{max}, whichever is higher
[d] only applicable for EES



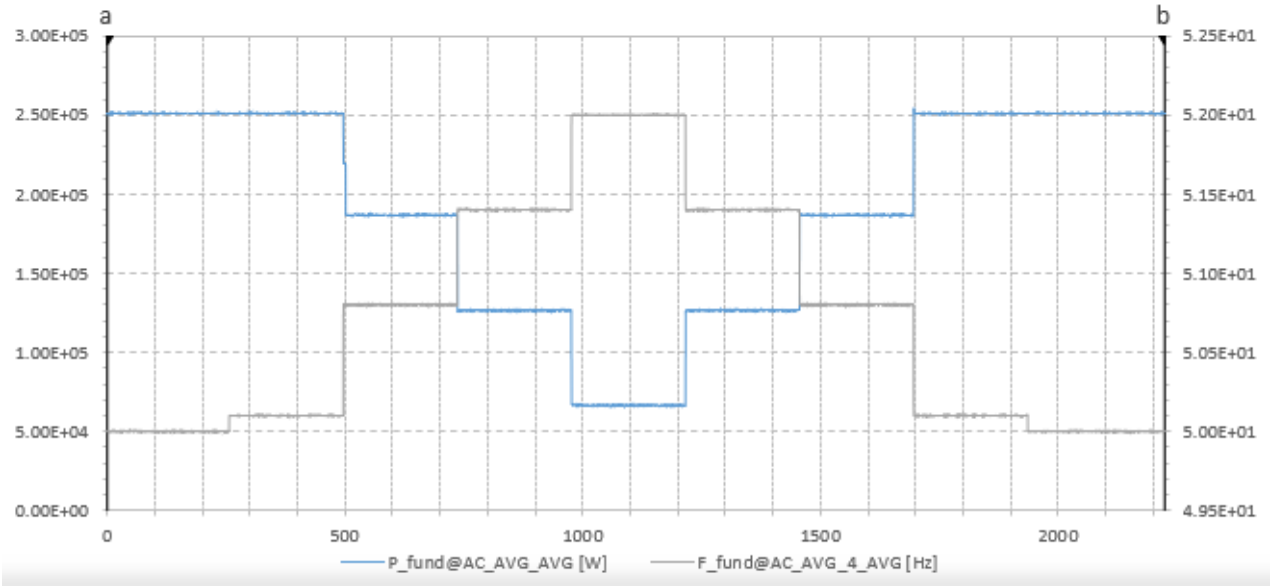
T_d: Dead time
T_{sr}: Step response time
T_s: Settling time
[a] Negative times are considered as zero

systems with energy storage ($P_{ref} = P_{max}$)
all other non-synchronous generating technology ($P_{ref} = P_M$)

Systems with energy storage ($P_{ref} = P_{max}$)
All other non-synchronous generating technology ($P_{ref} = P_M$)
Results shall be reported in tables and graphs.

Parameter	Test No. 1 (For ESS)- **Setting (a)-100%Pn**							P
Test Conditions	Measurements					Target value	Δ	Limitation
f [Hz]	P/Pn	f [Hz]	Tsr [s]	Ts [s]	Td [s]	P/Pn	Δ P/Pn	Δ P/Pn
50.00	100.40%	50.00	--	--	--	100%	0.40%	±10%
50.10	100.39%	50.10	--	--	--	100%	0.39%	
50.80	74.70%	50.80	0.4	0.4	0.1	76%	-1.30%	
51.40	50.57%	51.40	0.4	0.4	0.1	52%	-1.43%	
52.00	26.62%	52.00	0.5	0.5	0.1	28%	-1.38%	
51.40	50.56%	51.40	0.5	0.5	0.1	52%	-1.44%	
50.80	74.68%	50.80	0.4	0.4	0.1	76%	-1.32%	
50.10	100.38%	50.10	--	--	0.0	100%	0.38%	
50.00	100.39%	50.00	--	--	--	100%	0.39%	

Note(s):

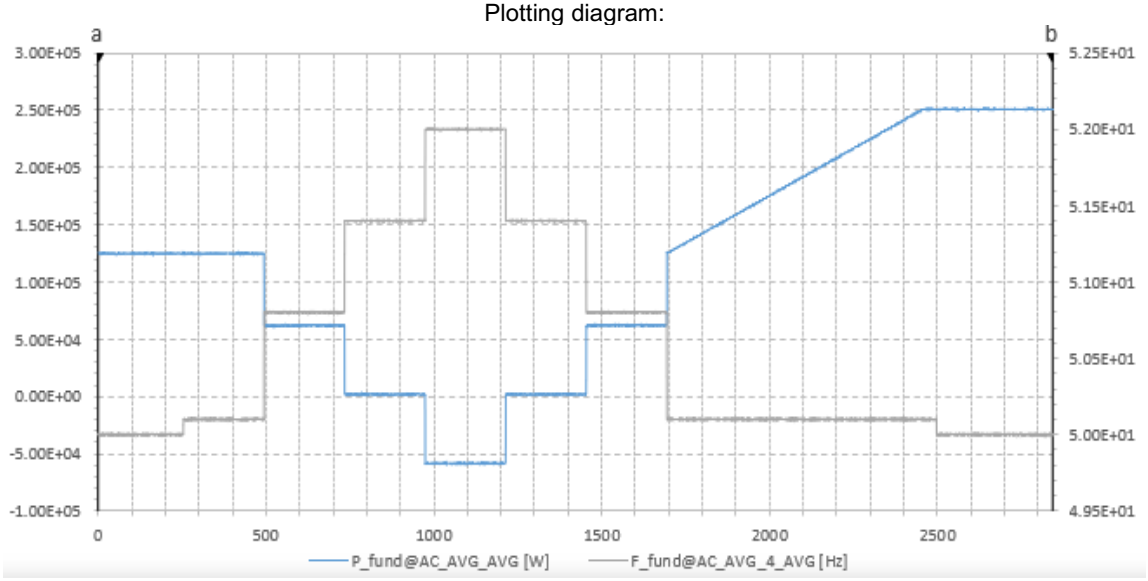


Parameter		Test No. 2 (For EES)- **Setting (a) (50%)Pn**						P
Test Conditions		Measurements					Target	Limit
f [Hz]	P_{rim} [%]	P/Pn	f [Hz]	T_{rise} [s]	T_{set} [s]	Td [s]	P/Pn [%]	ΔP [%]
50.00	50	49.93%	50.00	--	--	--	50%	±10%
50.10	50	49.92%	50.10	0.5	0.5	0.1	50%	
50.80	50	24.76%	50.80	0.5	0.5	0.1	26%	
51.40	50	0.68%	51.40	0.4	0.4	0.1	2%	
52.00	50	-23.41%	52.00	0.4	0.4	0.1	-22%	
51.40	50	0.69%	51.40	0.6	0.6	0.1	2%	
50.80	50->100	24.78%	50.80	0.5	0.5	0.1	26%	

Test Conditions		Measurements			Target	Limit	
f [Hz]	P_{rim} [%]	P/Pn [%]	f [Hz]	ΔP/Δt [%/min]	P/Pn	ΔP [%]	ΔP/Δt [%/min]
50.10	100	250924	50.10	9.07	100%	≤±10	≤10
50.00	100	250947	50.00	--	100%	≤±10	--

Note(s):

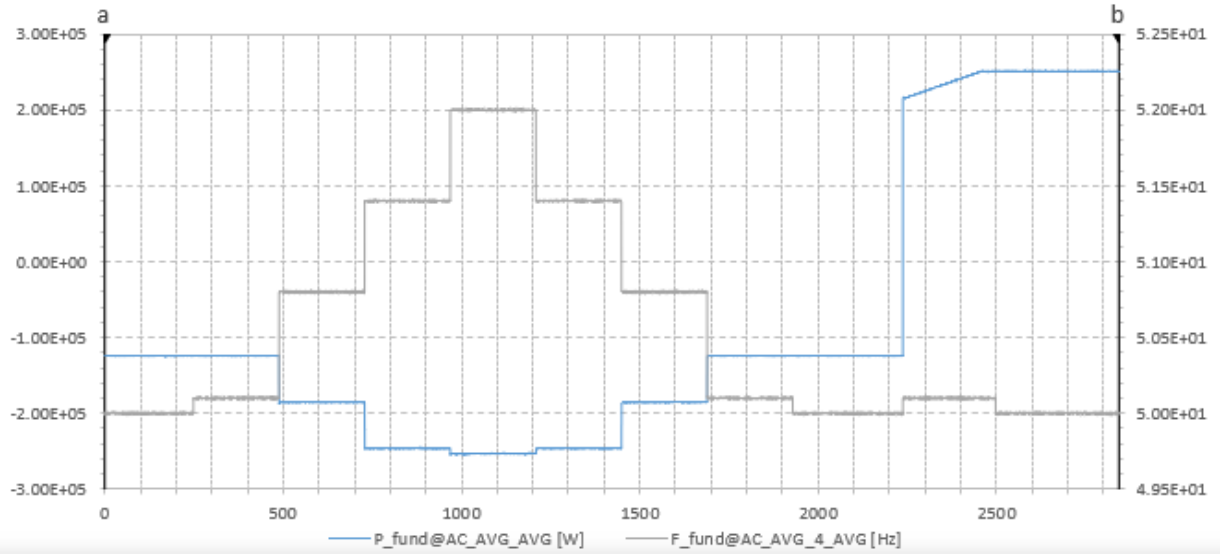
Plotting diagram:



Parameter	**Test No. 3 (For EES)- Setting (a)-(-50%)Pn**						P
Test Conditions	Measurements					Target	Limit
f [Hz]	P/Pn	f [Hz]	T_{rise} [s]	T_{set} [s]	Td [s]	P/Pn [%]	ΔP [%]
50.00	-49.71%	50.00	--	--	--	-50%	±10%
50.10	-49.72%	50.10	0.8	0.8	0.2	-50%	
50.80	-74.19%	50.80	0.8	0.8	0.2	-74%	
51.40	-98.57%	51.40	0.9	0.9	0.2	-98%	
52.00	-101.33%	52.00	0.8	0.8	0.1	-100%	
51.40	-98.57%	51.40	1.0	1.0	0.1	-98%	
50.80	-74.20%	50.80	1.0	1.0	0.2	-74%	
50.10	-49.71%	50.10	--	--	--	-50%	
Test Conditions	Measurements					Target	Limit

Note(s):

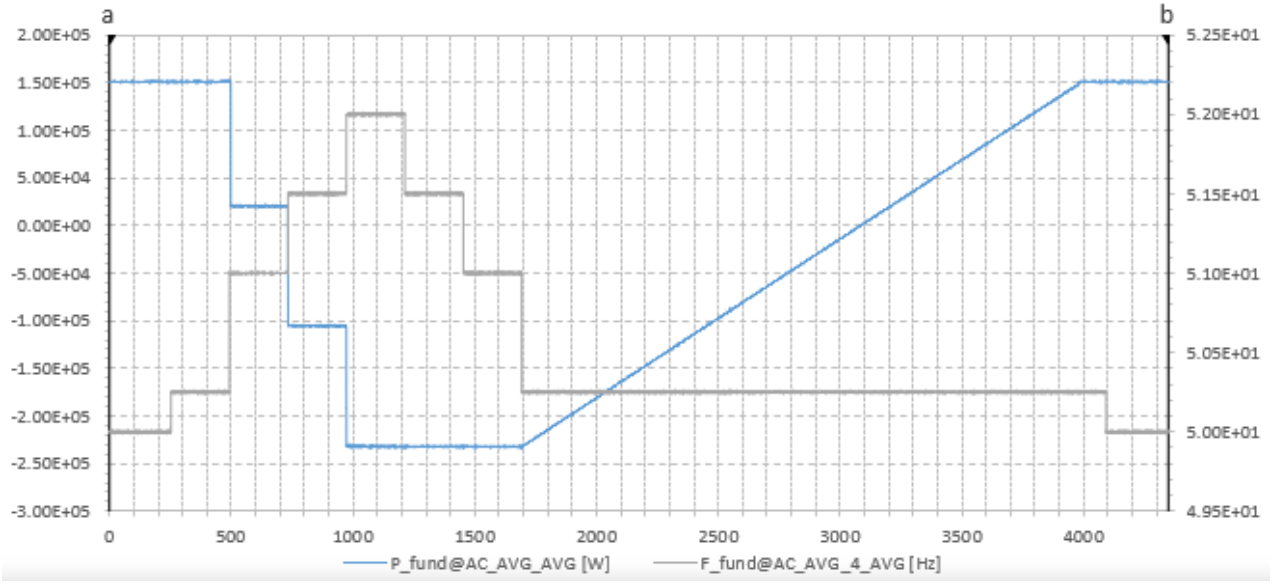
Plotting diagram:



Parameter	Test No. 4 (For EES)- **Setting (b)-60Pn**							P
Test Conditions	Measurements					Target value	Δ	Limitation
f [Hz]	P/Pn	f [Hz]	Tsr [s]	Ts [s]	Td [s]	P/Pn	Δ P/Pn	Δ P/Pn
50.00	60.33%	50.00	--	--	--	60%	0.33%	±10%
50.25	60.33%	50.25	0.9	0.9	0.1	60%	0.33%	
51.00	8.08%	51.00	0.8	0.8	0.1	10%	-1.92%	
51.50	-42.22%	51.50	0.8	0.8	0.2	-40%	-2.22%	
52.00	-92.84%	52.00	1.0	1.0	0.1	-90%	-2.84%	
51.50	-92.87%	51.50	0.8	0.8	0.1	-90%	-2.87%	
51.00	-92.85%	51.00	0.8	0.8	0.1	-90%	-2.85%	
50.25	60.33%	50.25	--	--	--	60%	0.33%	
50.00	60.33%	50.00	--	--	--	60%	0.33%	

Test Condition	Measurement		Limitation	
	Power Gradient [%Pn/min]	Delay Time [s]	Power Gradient [%Pn/min]	Delay Time [s]
51.00-50.25	7.99	1.4	≤ 10%	⩾1s

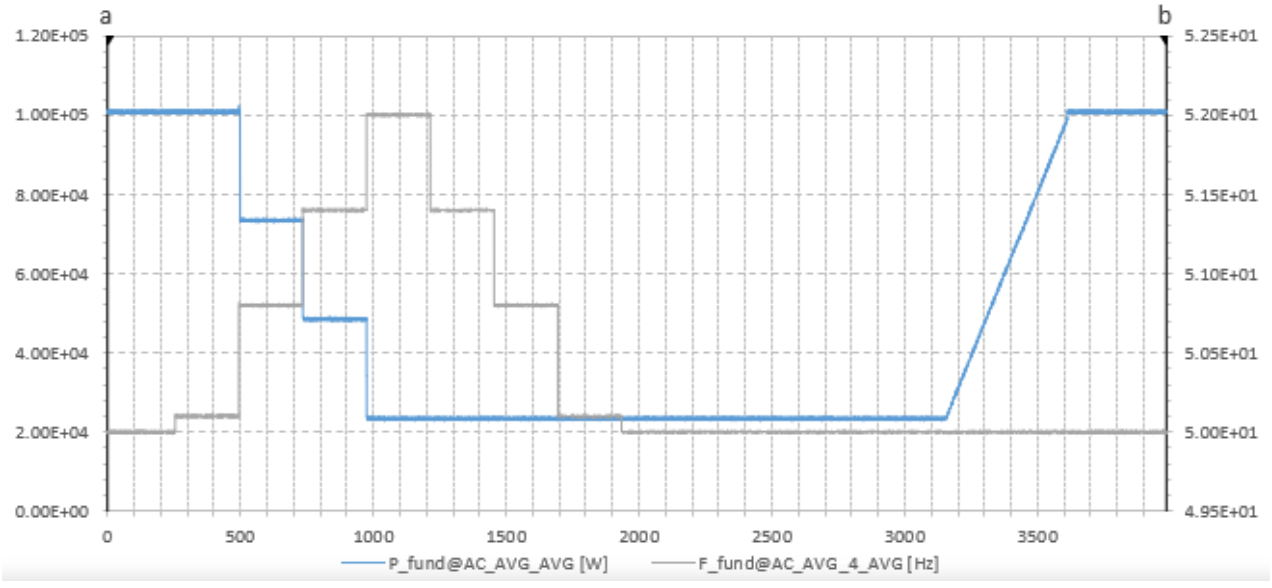
Note(s):



Parameter	Test No. 5 (For EES)- **Setting (c)-40Pn**							P
Test Conditions	Measurements					Target value	Δ	Limitation
f [Hz]	P/Pn	f [Hz]	Tsr [s]	Ts [s]	Td [s]	P/Pn	Δ P/Pn	Δ P/Pn
50.00	40.32%	50.00	--	--	--	40%	0.32%	±10%
50.10	40.33%	50.10	0.4	0.4	0.1	40%	0.33%	
50.80	29.36%	50.80	0.4	0.4	0.1	30%	-0.64%	
51.40	19.38%	51.40	0.5	0.5	0.1	20%	-0.62%	
52.00	9.36%	52.00	0.5	0.5	0.1	10%	-0.64%	
51.40	9.36%	51.40	--	--	--	10%	-0.64%	
50.80	9.37%	50.80	--	--	--	10%	-0.63%	
50.10	9.38%	50.10	--	--	--	10%	-0.62%	
50.00	40.32%	50.00	--	--	--	40%	0.32%	

Test Condition	Measurement		Limitation	
	Power Gradient [%Pn/min]	Delay Time [s]	Power Gradient [%Pn/min]	Delay Time [s]
50.10-50.00	7.95	613	≤ 10%	⩾600s

Note(s):



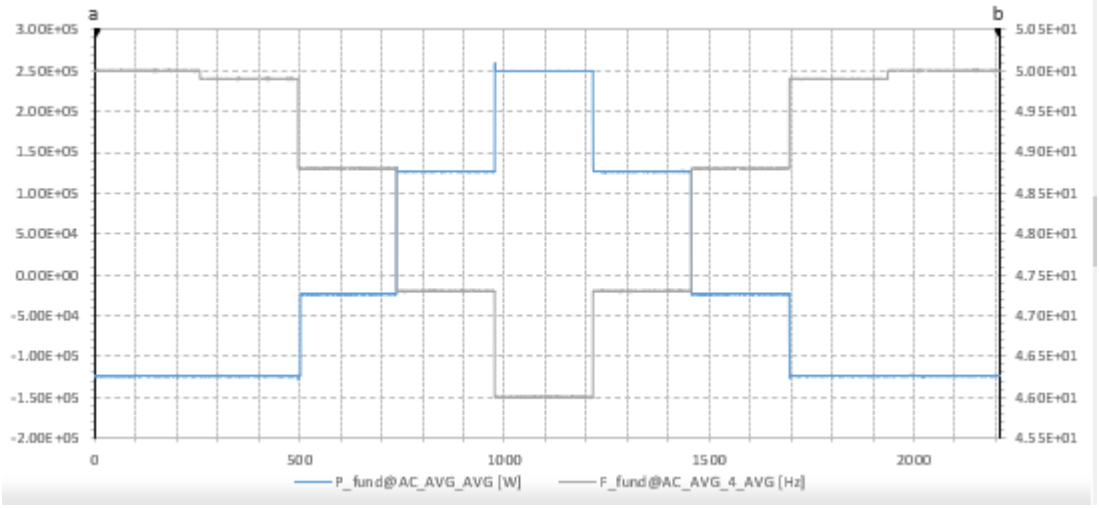
5.4.3.3	TABLE: Power response to under-frequency	P

Table 9 — Frequency threshold and droop

	Setting (a)	Setting (b)	Setting (c)
threshold frequency f_{th} [Hz]	49,8	49,5	49,8
droop [%]	5	2	12
power level at start of test [% P_n]	–50 / 0 [a]	0 [a]	5 0 [a]
Intentional delay [s]	0	0	2
configured deactivation threshold	No	No	No
P_{ref}	P_{max}	P_{max}	P_{max}
[a] or minimum regulating level, whichever is higher			

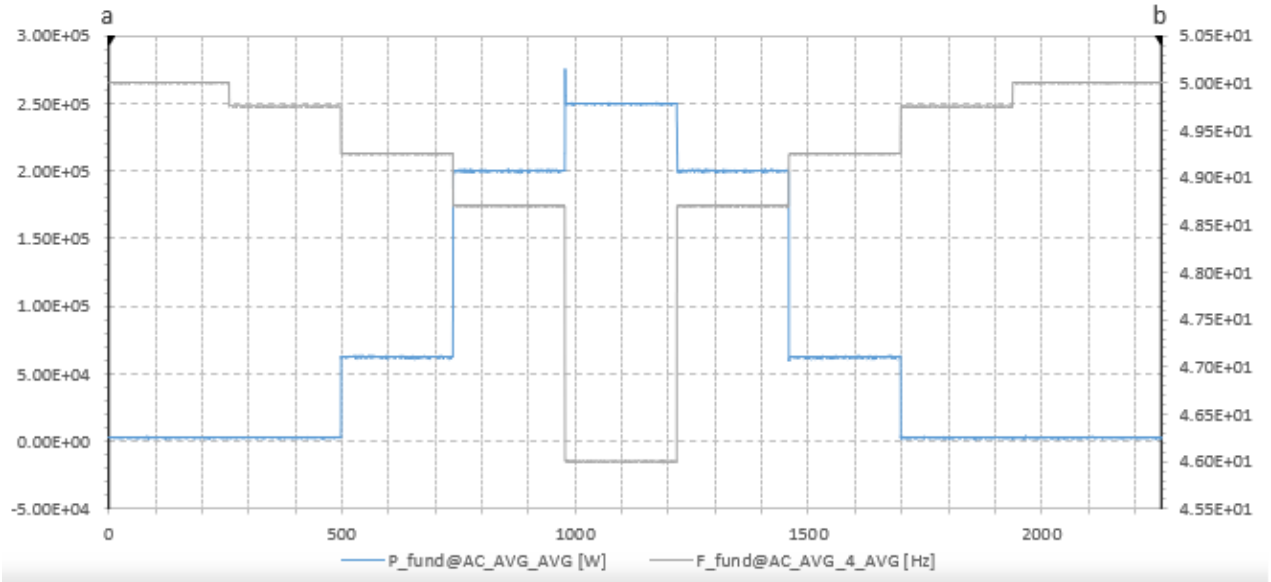
Parameter	Test No. 1 (For EES)- **Setting (a)-(-50%)Pn**							P
Test Conditions	Measurements					Target value	Δ	Limitation
f [Hz]	P/Pn	f [Hz]	Trise [s]	Tsettling [s]	Tv [s]	P/Pn	Δ P/Pn	Δ P/Pn
50.00	-49.72%	50.00	--	--	--	-50%	0.28%	±10%
49.90	-49.72%	49.90	--	--	--	-50%	0.28%	
48.80	-9.61%	48.80	0.5	0.5	0.1	-10%	0.39%	
47.30	50.48%	47.30	0.5	0.5	0.1	50%	0.48%	
46.00	99.81%	46.00	0.5	0.5	0.1	100%	-0.19%	
47.30	50.47%	47.30	0.5	0.5	0.1	50%	0.47%	
48.80	-9.62%	48.80	0.6	0.6	0.2	-10%	0.38%	
49.90	-49.71%	49.90	--	--	--	-50%	0.29%	
50.00	-49.71%	50.00	--	--	--	-50%	0.29%	

Note(s):



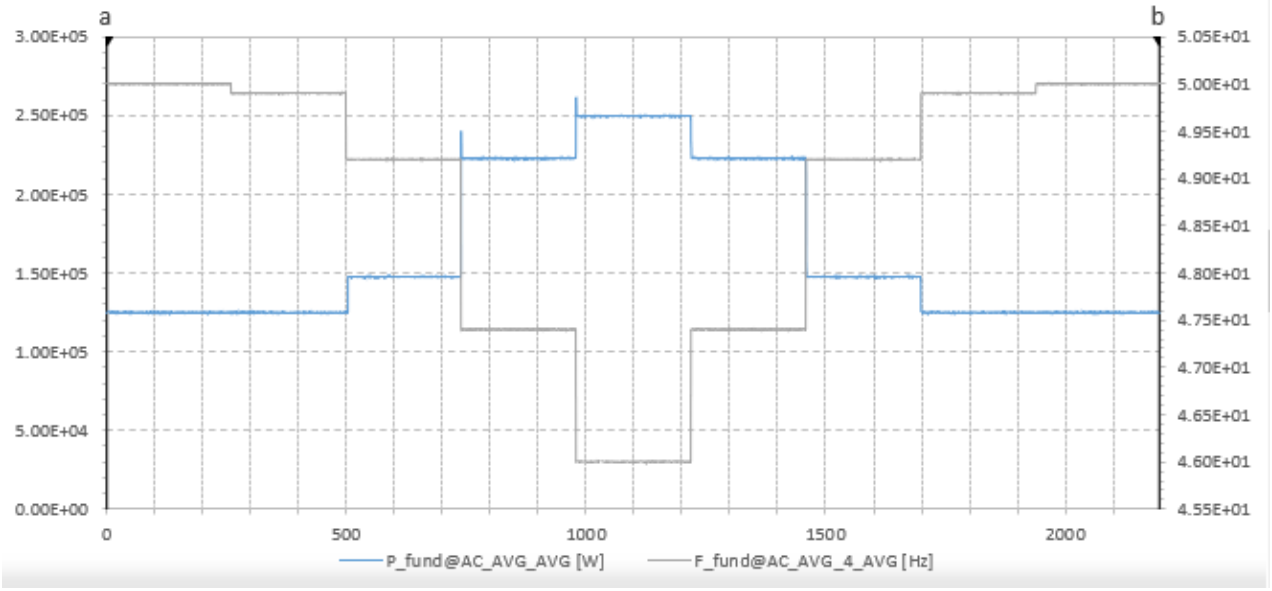
Parameter	Test No. 2 (For EES)- **Setting (b)-0%Pn**							P
Test Conditions	Measurements					Target value	Δ	Limitation
f [Hz]	P/Pn	f [Hz]	Trise [s]	Tsettling [s]	Tv [s]	P/Pn	Δ P/Pn	Δ P/Pn
50.00	1.04%	50.00	--	--	--	0%	1.04%	±10%
49.75	1.04%	49.75	--	--	--	0%	1.04%	
49.25	24.94%	49.25	0.6	0.6	0.1	25%	-0.06%	
48.70	79.94%	48.70	0.4	0.4	0.1	80%	-0.06%	
46.00	99.80%	46.00	0.4	0.4	0.1	100%	-0.20%	
48.70	79.93%	48.70	0.5	0.5	0.1	80%	-0.07%	
49.25	24.87%	49.25	0.5	0.5	0.1	25%	-0.13%	
49.75	1.01%	49.75	--	--	0.1	0%	1.01%	
50.00	1.01%	50.00		--	--	0%	1.01%	

Note(s):
P(f) curve setting for test: f1: 49.5Hz; fstop: 49.5Hz (Deactivated); Droop: 2% (100%Pref / Hz)



Parameter	Test No. 3 (For EES)- **Setting (c)-50%Pn**							P
Test Conditions	Measurements					Target value	Δ	Limitation
f [Hz]	P/Pn	f [Hz]	Trise [s]	Tsettling [s]	Tv [s]	P/Pn	Δ P/Pn	Δ P/Pn
50.00	49.92%	50.00	--	--	--	50%	-0.08%	±10%
49.90	49.92%	49.90	--	--	--	50%	-0.08%	
49.20	58.97%	49.20	0.9	0.9	0.1	60%	-1.03%	
47.40	89.04%	47.40	0.9	0.9	0.1	90%	-0.96%	
46.00	99.80%	46.00	0.8	0.8	0.1	100%	-0.20%	
47.40	89.05%	47.40	0.8	0.8	0.1	90%	-0.95%	
49.20	58.97%	49.20	0.8	0.8	0.1	60%	-1.03%	
49.90	49.92%	49.90	--	--	0.1	50%	-0.08%	
50.00	49.92%	50.00	--	--	--	50%	-0.08%	

Note(s):



5.5.1	TABLE: Power capabilities assessment	P
5.5.1.3	TABLE: Verification procedure to determine the power capability (active, reactive, apparent) at nominal voltage	P

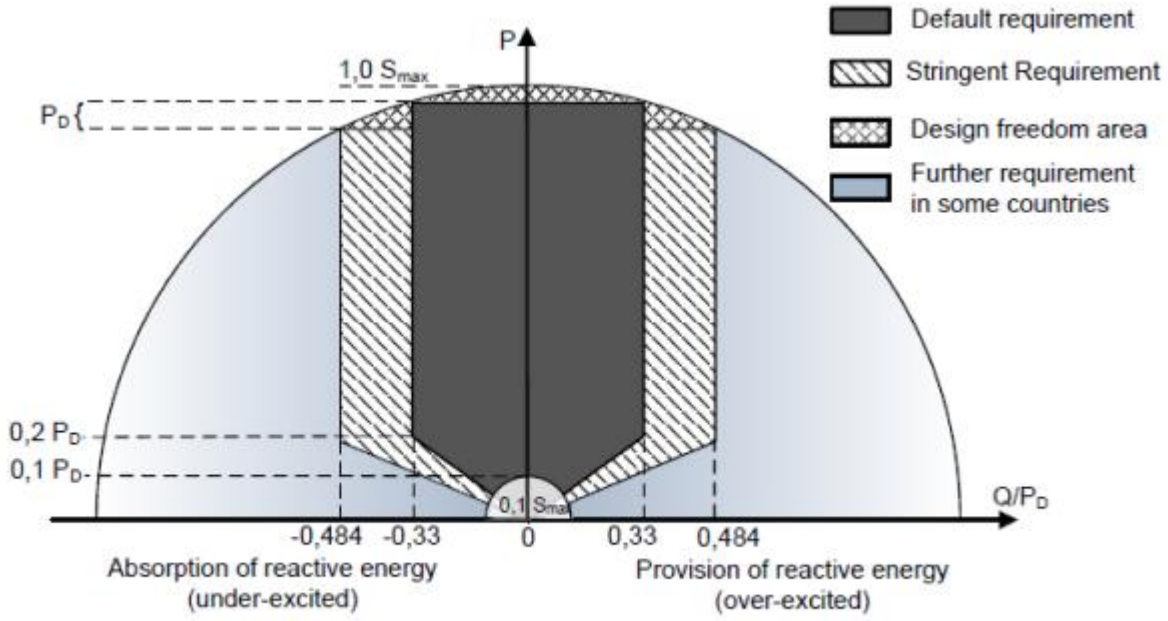


Figure 26 — reactive power capability at nominal voltage

Test Conditions		Measurements				Limit
P/Pn [%]	Q/Pn [%]	P/Pn	Q/Pn	cos(φ)	U/Un	Q/Pn
0%	0	2.14%	-0.15%	0.906	99.97%	--
10%		10.03%	-0.21%	0.996	100.01%	⩽ ±2%
20%		20.08%	-0.28%	0.999	99.64%	
30%		30.15%	-0.35%	1.000	99.69%	
40%		40.17%	-0.41%	1.000	99.74%	
50%		50.10%	-0.46%	1.000	99.79%	
60%		60.10%	-0.53%	1.000	99.85%	
70%		70.11%	-0.62%	1.000	99.91%	
80%		80.13%	-0.73%	1.000	99.96%	
90%		90.15%	-0.85%	1.000	100.02%	
100%		99.76%	-0.97%	1.000	100.07%	
0%	max. under-excited	-0.44%	-100.35%	-0.004	99.62%	--
10%		10.03%	-100.39%	0.099	99.68%	⩽-22.2%

20%		20.07%	-100.44%	0.196	99.74%	
30%		30.10%	-100.49%	0.287	99.79%	
40%		40.12%	-100.55%	0.371	99.85%	
50%		43.57%	-100.58%	0.397	99.87%	
60%		43.57%	-100.58%	0.397	99.87%	⩽ -41.6%
70%		43.56%	-100.58%	0.397	99.87%	
80%		43.55%	-100.58%	0.397	99.87%	
90%		43.55%	-100.58%	0.397	99.87%	
Smax		43.56%	-100.58%	0.397	99.87%	
0%	max. over-excited	0.06%	99.98%	0.001	100.30%	--
10%		10.12%	99.95%	0.101	100.36%	⩾+22.2%
20%		20.17%	99.91%	0.198	100.41%	
30%		30.18%	99.85%	0.289	100.46%	
40%		40.22%	99.80%	0.374	100.52%	
50%		45.51%	99.76%	0.415	100.55%	
60%		45.52%	99.77%	0.415	100.55%	⩾+41.6%
70%		45.52%	99.76%	0.415	100.55%	
80%		45.51%	99.80%	0.415	100.55%	
90%		45.51%	99.80%	0.415	100.55%	
Smax		45.53%	99.79%	0.415	100.55%	

5.5.1.6	TABLE: Verification procedure for reactive power capability considering voltage range	P

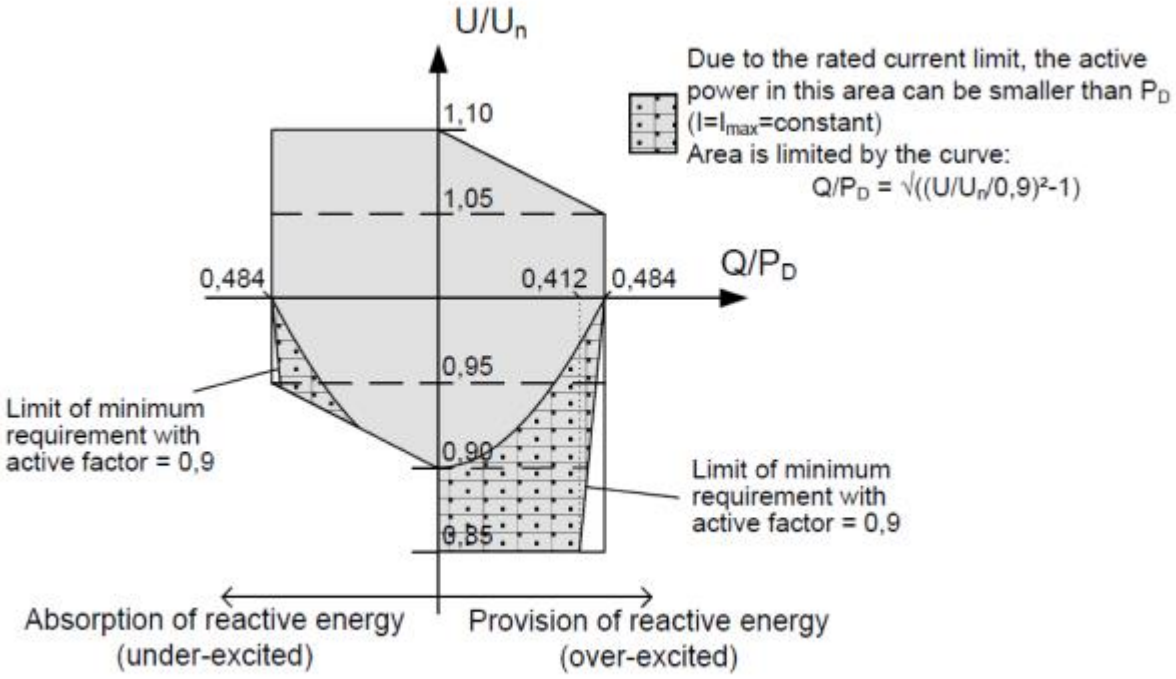


Figure 30 — Example: U-Q normalized diagram taken from the EN 50549-1

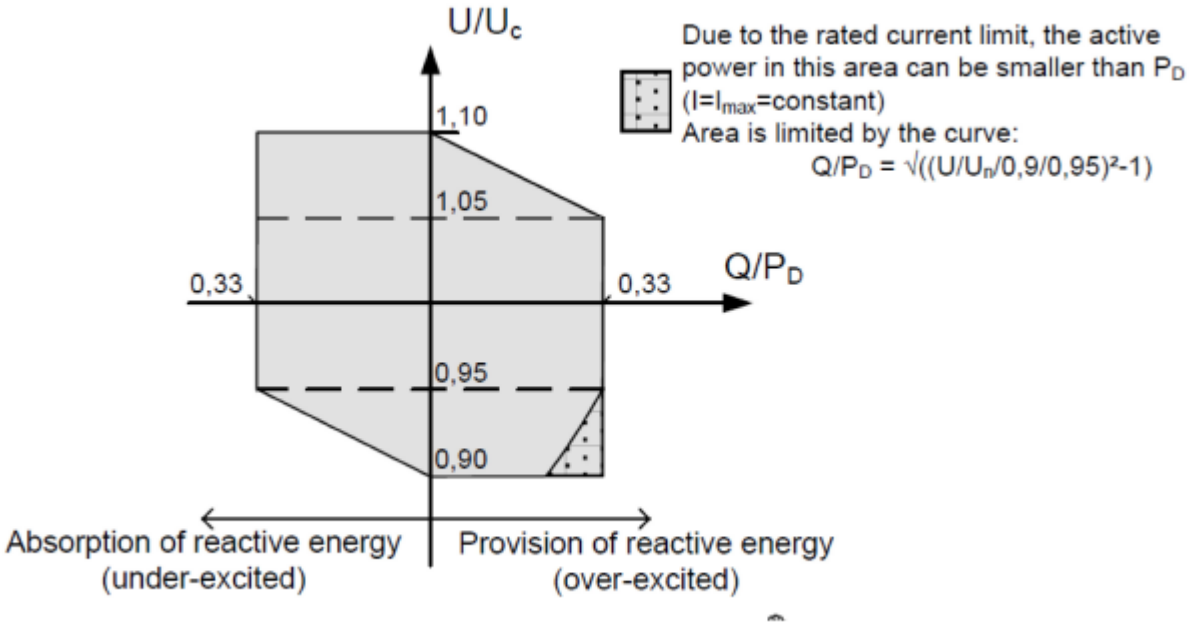
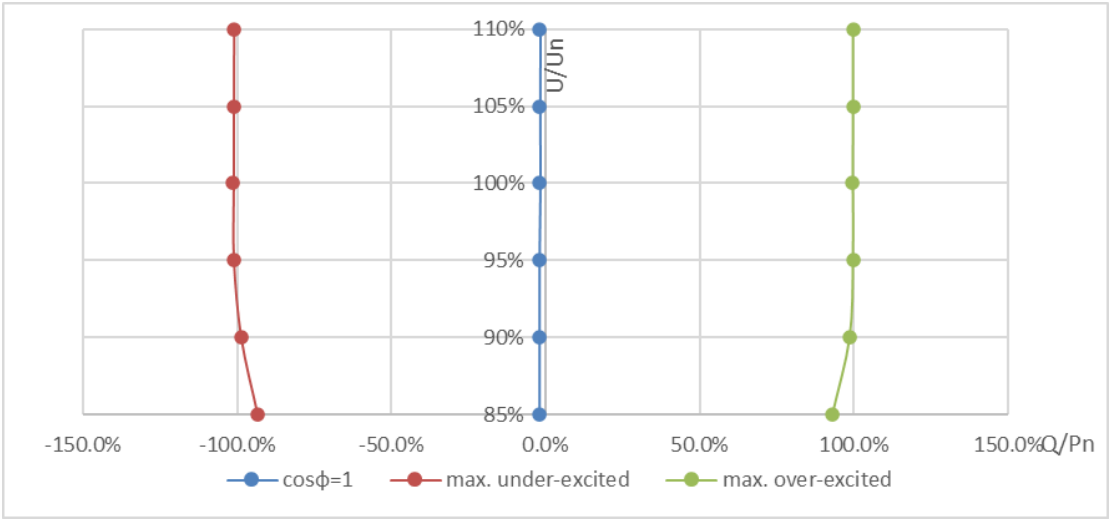


Figure 31 — Example of U-Q normalized diagram taken from the EN 50549-2

Test Conditions		Measurements					Target value	Δ	Δ Limit
U/Un	Q/Pn [%]	P/Pn	Q/Pn	S/Sn	I/In	U/Un	Q/Pn	Δ Q/Pn	Δ Q/Pn
85%	0	93.22%	-1.94%	93.24%	109.99%	85.13%	--	--	--
90%		93.22%	-1.94%	93.24%	109.99%	85.13%	--	--	
95%		100.39%	-1.94%	100.41%	106.03%	95.08%	--	--	
100%		100.01%	-1.81%	100.03%	100.37%	100.06%	--	--	
105%		100.43%	-1.83%	100.44%	95.99%	105.04%	--	--	
110%		100.36%	-1.81%	100.38%	91.61%	109.99%	--	--	
85%	max. under-excited	-0.95%	-93.42%	93.43%	110.33%	85.02%	--	--	--
90%		-1.00%	-98.91%	98.92%	110.33%	90.02%	--	--	
95%		24.63%	-101.33%	104.28%	110.23%	94.97%	-41.4%	-59.93%	≤2%
100%		42.89%	-101.37%	110.07%	110.16%	100.30%	-43.6%	-57.77%	
105%		44.98%	-101.33%	110.86%	105.88%	105.10%	-43.6%	-57.73%	
110%		45.00%	-101.27%	110.82%	101.03%	110.10%	-43.6%	-57.67%	
85%	max. over-excited	-0.50%	93.21%	93.22%	110.26%	84.89%	37.1%	56.11%	≥ -2%
90%		-0.53%	98.70%	98.70%	110.25%	89.89%	39.2%	59.50%	
95%		30.27%	99.79%	104.28%	110.16%	95.06%	41.4%	58.39%	
100%		45.52%	99.74%	109.63%	109.96%	100.12%	43.6%	56.14%	
105%		45.54%	99.77%	109.67%	104.80%	105.09%	43.6%	56.17%	
110%		45.55%	99.80%	109.71%	100.10%	110.07%	--	--	--

Diagram:



5.5.2	TABLE: Voltage support by reactive power- test to determine the reactive power control modes	P
5.5.2.3	TABLE: Verification procedure for Set point control	

Test no.1: Test for reactive power set point control accuracy

P=50%Pn

Reactive power step Q/Pn (pu)	Voltage	Set point Value	Measured Value	Deviation	Δ Limit
	p.u.	Q/Pn p.u.	Q/Pn p.u.	Q/Pn p.u.	
Q=0	230.5	0	906	0.36%	±2%Smax
$Q_{max,oe}$	231.3	100%	246815	-1.27%	
$Q_{max,ue}$	229.7	-100%	-247924	0.83%	

Test no.2: Test for dynamic response — P

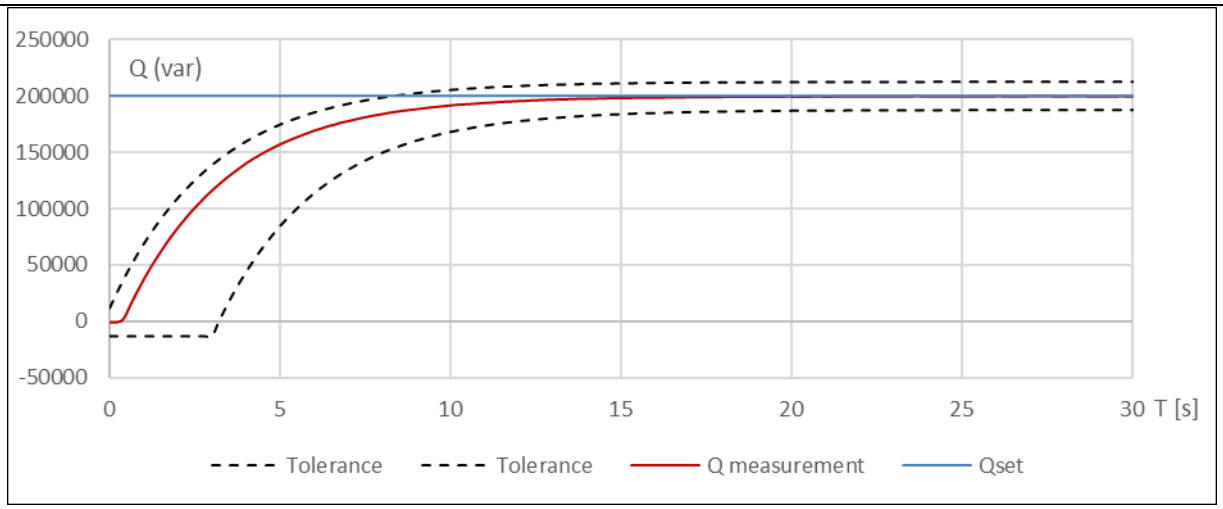
Tau= shortest time constant (not longer than 3s) 3s

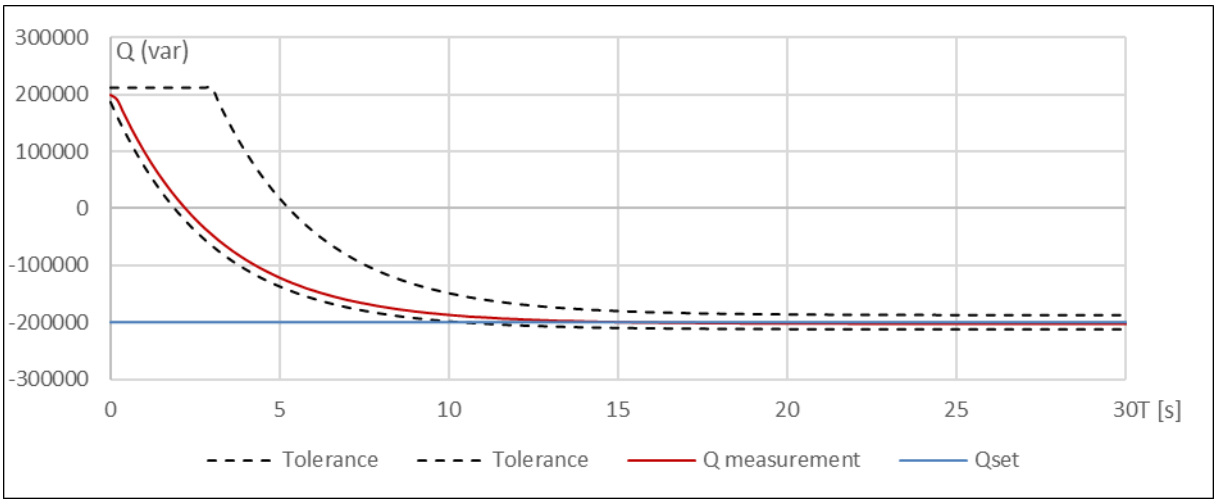
Reactive power set point step p.u.	Generating unit response time setting	Measured response behaviour	
		dead time	response time / settling time
Q=0 → 80%$Q_{max,oe}$	9s	0.4	9.6
80%$Q_{max,oe}$ → 80%$Q_{max,ue}$	9s	0.2	9.4
80%$Q_{max,ue}$ → Q=0	9s	0.4	9.0

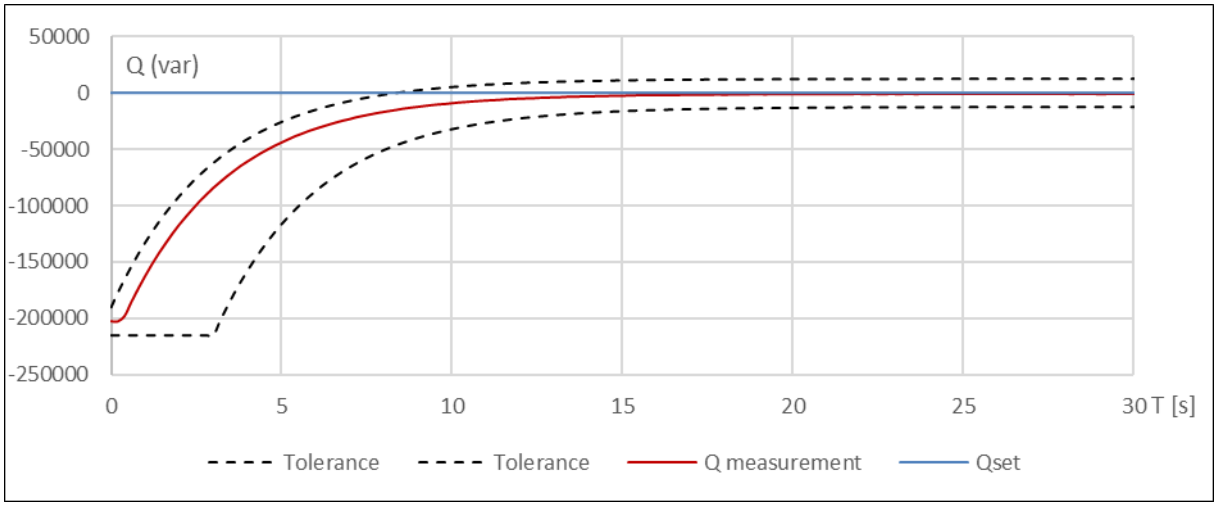
Tau= longest time (if longest time>60s, then test 60s) 60s

Reactive power set point step p.u.	Generating unit response time setting	Measured response behaviour	
		dead time	response time / settling time
Q=0 → 80%$Q_{max,oe}$	180s	0.0	178.6
80%$Q_{max,oe}$ → 80%$Q_{max,ue}$	180s	0.0	179.0
80%$Q_{max,ue}$ → Q=0	180s	0.0	179.8

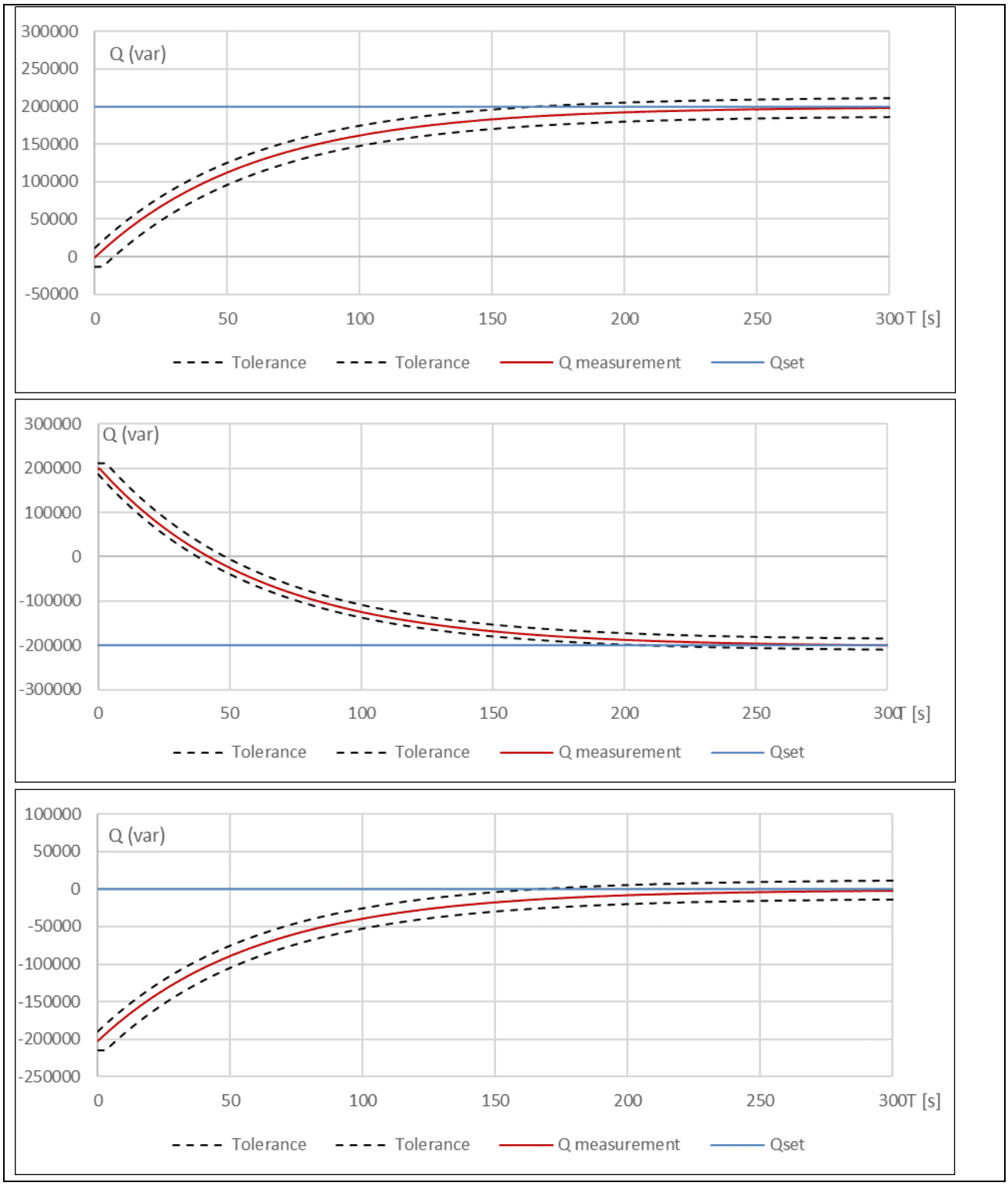
Diagram:
Tau= 3s


Q (var)
250000
200000
150000
100000
50000
0
-50000
0
5
10
15
20
25
30 T [s]
Tolerance
Tolerance
Q measurement
Qset


Q (var)
300000
200000
100000
0
-100000
-200000
-300000
0
5
10
15
20
25
30T [s]
Tolerance
Tolerance
Q measurement
Qset


Q (var)
50000
0
-50000
-100000
-150000
-200000
-250000
0
5
10
15
20
25
30 T [s]
Tolerance
Tolerance
Q measurement
Qset

Tau= 60s


Q (var)
300000
250000
200000
150000
100000
50000
0
-50000
0
50
100
150
200
250
300T [s]
Tolerance
Tolerance
Q measurement
Qset
Q (var)
300000
200000
100000
0
-100000
-200000
-300000
0
50
100
150
200
250
300T [s]
Tolerance
Tolerance
Q measurement
Qset
Q (var)
100000
50000
0
-50000
-100000
-150000
-200000
-250000
0
50
100
150
200
250
300T [s]
Tolerance
Tolerance
Q measurement
Qset

5.5.2.4	TABLE: Verification procedure for voltage related control mode for reactive power Q(U)	P

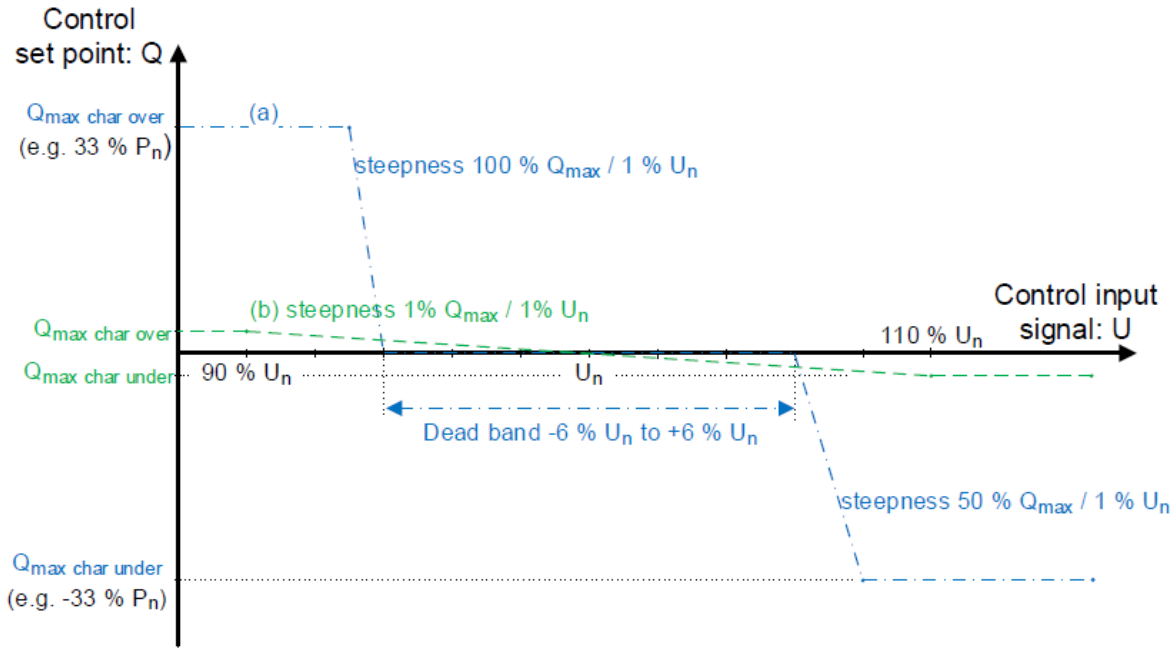


Figure 33 — Q(U) example characteristics for setting (a) and (b) for the test

Table 17 — Q(U) characteristic configuration

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

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

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

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

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

Table 18 — Q(U) additional parameter configuration

parameter	Setting (a)	Setting (b)
Time constant	as fast as possible but not slower as 3 s	as slow as possible but not slower as 20 s
Min cos φ	0,4	deactivated
Lock-in power	deactivated	20 %P_n[a]
Lock-out power	deactivated	5 %P_n[b]

[a] or minimum regulation level +20 % P_n, whichever is higher.

[b] or minimum regulation level +5 % P_n, whichever is higher

5.5.2.4.2	TABLE: Test procedure for steady-state behaviour

Test procedure for accuracy-**Setting (a)**

Q(U) curve settings:	Set points	X1	X2	X3	X4
	U/Un	93%	94%	106%	108%
	Q/Qmax	100%	0	0	-100%

Test Conditions		Measurements			Target value	Δ	Δ Limits	
U/Un	P/Pn	Q/Pn	U/Un	Cosφ	Q/Pn*	ΔQ/ Smax	ΔQ/ Smax	Cosφ
100%	100%	-0.47%	100.5%	1.000	0	0.47%	⩽ ±2 Smax%	≥0.4
103%	100%	-0.29%	103.5%	1.000	0	0.29%		
105%	100%	-0.17%	105.5%	1.000	0	0.17%		
107%	100%	-29.74%	107.5%	0.959	-30%	0.26%		
108%	100%	-59.87%	108.7%	0.839	-60%	0.13%		
111%	100%	-60.23%	111.2%	0.837	-60%	0.23%		
114%	100%	-60.03%	114.2%	0.838	-60%	0.03%		
115%	100%	-59.95%	115.2%	0.838	-60%	0.05%		
114%	100%	-60.02%	114.2%	0.838	-60%	0.02%		
111%	100%	-60.23%	111.2%	0.837	-60%	0.23%		
108%	100%	-59.94%	108.7%	0.839	-60%	0.06%		
107%	100%	-29.75%	107.5%	0.959	-30%	0.25%		
105%	100%	-0.18%	105.5%	1.000	0	0.18%		
103%	100%	-0.30%	103.5%	1.000	0	0.30%		
100%	100%	-0.48%	100.5%	1.000	0	0.48%		
97%	100%	-0.65%	97.5%	1.000	0	0.65%		
94%	100%	-0.82%	94.5%	1.000	0	0.82%		
93%	100%	59.54%	92.9%	0.812	60%	0.46%		
90%	100%	59.47%	90.7%	0.802	60%	0.53%		
87%	100%	59.37%	87.7%	0.787	60%	0.63%		
85%	100%	59.32%	85.7%	0.775	60%	0.68%		
87%	100%	59.37%	87.7%	0.787	60%	0.63%		
90%	100%	59.46%	90.7%	0.802	60%	0.54%		
93%	100%	59.53%	92.9%	0.812	60%	0.47%		
94%	100%	-0.83%	94.5%	1.000	0	0.83%		

97%	100%	-0.66%	97.5%	1.000	0	0.66%		
100%	100%	-0.49%	100.5%	1.000	0	0.49%		
100%	20%	0.18%	100.07%	1.000	0	0.18%		
103%	20%	0.32%	103.06%	1.000	0	0.32%		
105%	20%	0.43%	105.06%	1.000	0	0.43%		
107%	20%	-29.28%	107.79%	0.571	-30%	0.72%		
108%	20%	-47.02%	108.98%	0.396	-60%	12.98%*		
111%	20%	-46.91%	110.92%	0.397	-60%	13.09%*		
114%	20%	-46.75%	113.92%	0.398	-60%	13.25%*		
115%	20%	-46.70%	114.92%	0.399	-60%	13.30%*		
114%	20%	-46.75%	113.92%	0.398	-60%	13.25%*		
111%	20%	-46.92%	110.92%	0.397	-60%	13.08%*		
108%	20%	-47.01%	108.98%	0.396	-60%	12.99%*		
107%	20%	-29.20%	107.79%	0.572	-30%	0.80%		
105%	20%	0.42%	105.06%	1.000	0	0.42%		
103%	20%	0.32%	103.06%	1.000	0	0.32%		
100%	20%	0.18%	100.07%	1.000	0	0.18%		
97%	20%	0.05%	97.07%	1.000	0	0.05%		
94%	20%	0.68%	94.64%	0.999	0	0.68%		
93%	20%	37.12%	92.38%	0.485	60%	22.88%*		
90%	20%	37.03%	90.21%	0.486	60%	22.97%*		
87%	20%	36.90%	87.22%	0.488	60%	23.10%*		
85%	20%	36.82%	85.23%	0.488	60%	23.18%*		
87%	20%	36.91%	87.22%	0.487	60%	23.09%*		
90%	20%	37.03%	90.21%	0.486	60%	22.97%*		
93%	20%	37.12%	92.38%	0.485	60%	22.88%*		
94%	20%	0.64%	94.64%	0.999	0	0.64%		
97%	20%	0.06%	97.07%	1.000	0	0.06%		
100%	20%	0.18%	100.07%	1.000	0	0.18%		

Note(s):
Time constant: as fast as possible but not slower as 3 s.
Min cos φ: 0.4,
P lock-in: deactivated; P lock-out: deactivated.
*: The accuracy exceeding 2% Smax is due to prioritizing the requirement of Min cos φ: 0.4.

Test procedure for accuracy-**Setting (b)**						
Q(U) curve settings:	Set points	X1		X2		X3
	U/Un	90%		100%		110%
	Q/Qmax	10%		0%		-10%
Test Conditions		Measurements		Target value	Δ	Δ Limits
U/Un	P/Pn	Q/Pn	U/Un	Q/Pn*	ΔQ/ Smax	ΔQ/ Smax
100%	100%	-0.63%	100.50%	0.00%	-0.63%	≤ ±2 Smax%A
103%	100%	-2.24%	103.48%	-1.80%	-0.44%	
106%	100%	-3.85%	106.46%	-3.60%	-0.25%	
109%	100%	-5.44%	109.45%	-5.40%	-0.04%	
112%	100%	-5.83%	112.43%	-6.00%	0.17%	
115%	100%	-5.83%	115.42%	-6.00%	0.17%	
112%	100%	-5.84%	112.43%	-6.00%	0.16%	
109%	100%	-5.45%	109.45%	-5.40%	-0.05%	
106%	100%	-3.85%	106.47%	-3.60%	-0.25%	
103%	100%	-2.26%	103.49%	-1.80%	-0.46%	
100%	100%	-0.67%	100.51%	0.00%	-0.67%	
97%	100%	1.17%	97.07%	1.80%	-0.63%	
94%	100%	2.79%	94.05%	3.60%	-0.81%	
91%	100%	4.43%	91.03%	5.40%	-0.97%	
88%	100%	4.83%	87.99%	6.00%	-1.17%	
85%	100%	4.73%	84.95%	6.00%	-1.27%	
88%	100%	4.82%	87.78%	6.00%	-1.18%	
91%	100%	4.41%	91.04%	5.40%	-0.99%	
94%	100%	2.79%	94.06%	3.60%	-0.81%	
97%	100%	1.16%	97.08%	1.80%	-0.64%	
100%	100%	-0.71%	100.53%	0.00%	-0.71%	
100%	20%	0.51%	100.07%	0.00%	0.51%	
103%	20%	-1.13%	103.06%	-1.80%	0.67%	
106%	20%	-2.82%	106.14%	-3.60%	0.78%	
109%	20%	-4.41%	109.04%	-5.40%	0.99%	
112%	20%	-5.24%	112.04%	-6.00%	0.76%	

115%	20%	-5.07%	115.03%	-6.00%	0.93%	
112%	20%	-5.24%	112.03%	-6.00%	0.76%	
109%	20%	-4.41%	109.04%	-5.40%	0.99%	
106%	20%	-2.82%	106.14%	-3.60%	0.78%	
103%	20%	-1.13%	103.06%	-1.80%	0.67%	
100%	20%	0.52%	100.07%	0.00%	0.52%	
97%	20%	2.17%	97.08%	1.80%	0.37%	
94%	20%	3.82%	94.09%	3.60%	0.22%	
91%	20%	5.49%	91.10%	5.40%	0.09%	
88%	20%	5.83%	88.11%	6.00%	-0.17%	
85%	20%	5.61%	85.12%	6.00%	-0.39%	
88%	20%	5.71%	88.11%	6.00%	-0.29%	
91%	20%	5.48%	91.10%	5.40%	0.08%	
94%	20%	3.82%	94.09%	3.60%	0.22%	
97%	20%	2.17%	97.08%	1.80%	0.37%	
100%	20%	0.51%	100.07%	0.00%	0.51%	

Note(s):
Time constant: as slow as possible but not slower as 20 s.
P lock-in: 20%Pn; P lock-out: 5%Pn.

5.5.2.4.3	TABLE: Test procedure for dynamic behaviour	P

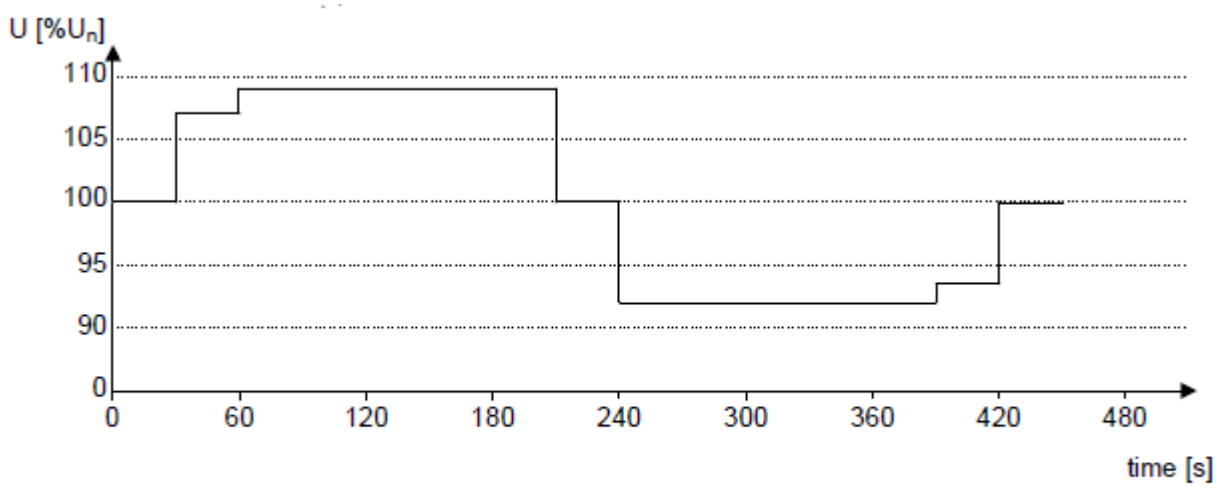


Figure 34 — Example voltage profile for setting (a) applied for the test of the dynamic behaviour of the Q(U), assuming < 30 s for stabilization of P and Q

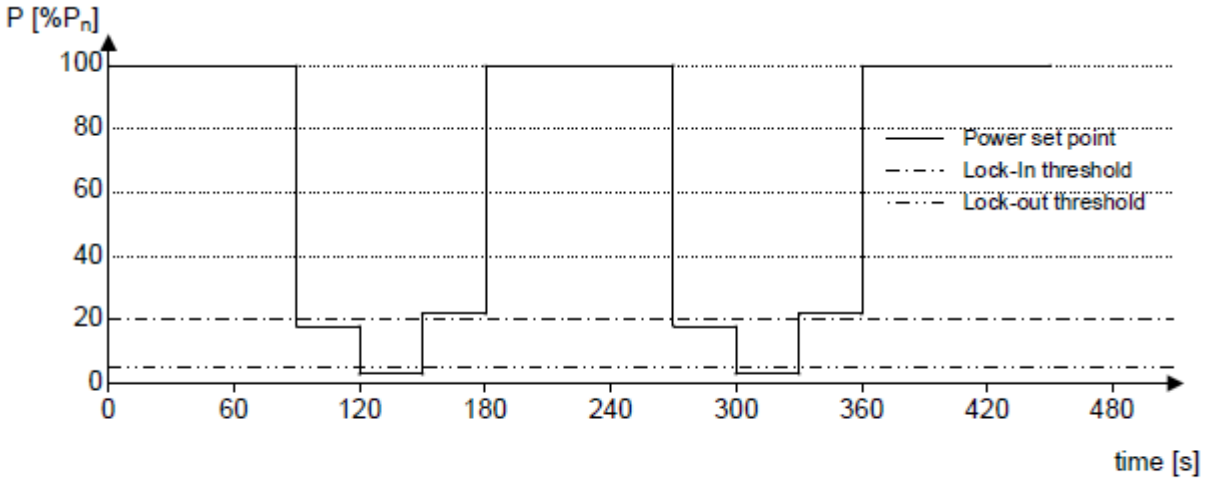


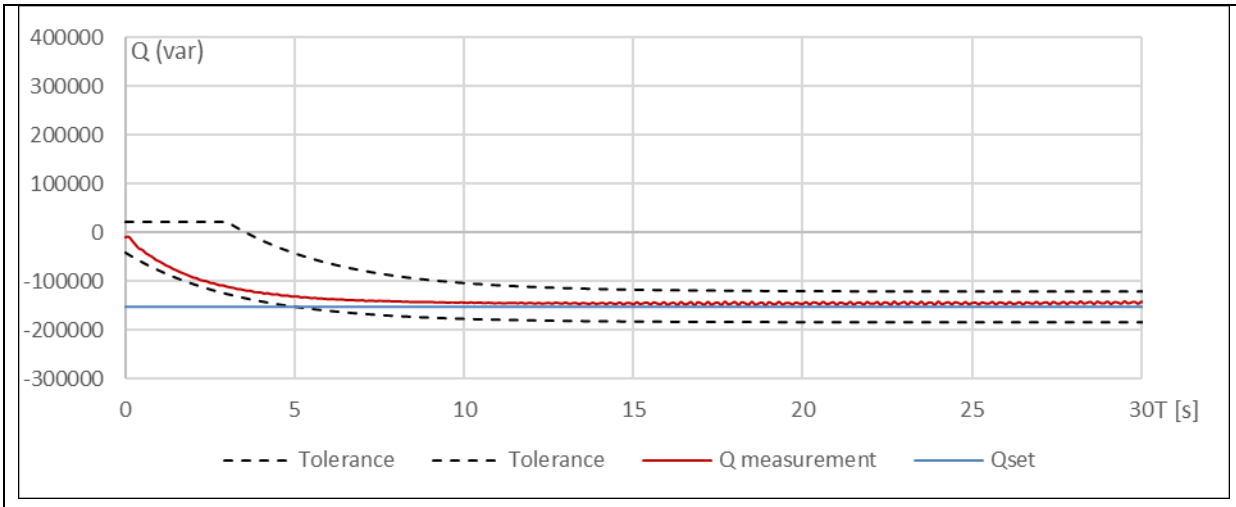
Figure 35 — Example active power set point profile for setting (a) applied for the test of the dynamic behaviour of the Q(U) control, assuming < 30 s for stabilization of P and Q

Q(U) curve settings:	Set points	X1	X2	X3
	U/Un	90%	100%	110%
	Q/Qmax	10%	0%	-10%
	Tau	20s		

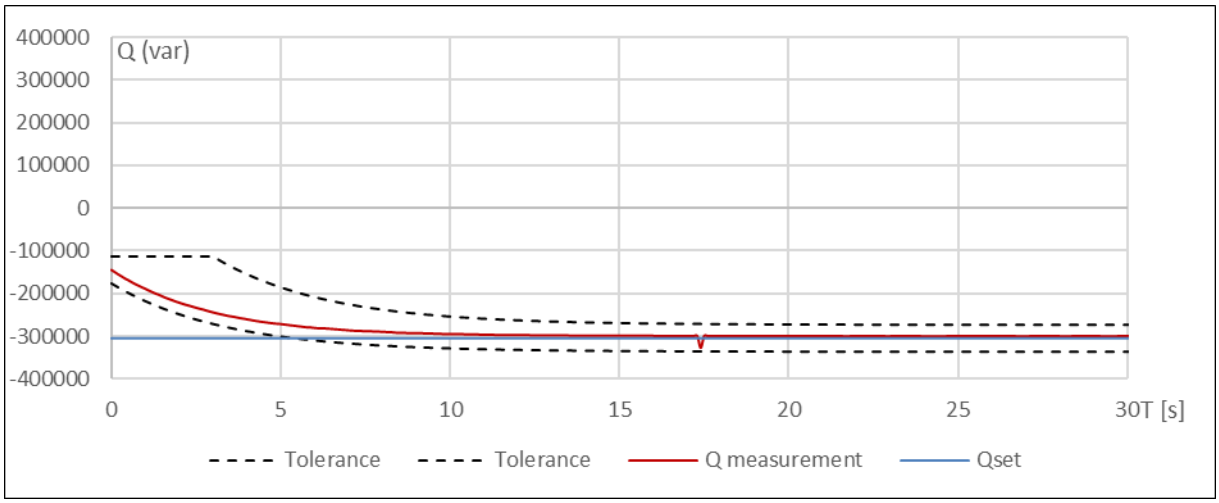
Test Conditions		Measurements			Deviation	Target value	Compliance to the PT-1 curve?	Δ Limits
U/Un	P/Pn	Q/Pn [%]	P/Pn [%]	U/Un [%]	ΔQ/Pn [%]	Q/Pn*	Yes/No	ΔQ/Pn
100%	100%	-0.68%	100.59%	100.5%	-0.68%	0%	N/A	⩽ ±5%
105%	100%	-3.34%	100.61%	105.5%	-0.34%	-3%	Yes	
110%	100%	-5.98%	100.64%	110.4%	0.02%	-6%	Yes	
110%	18%	-4.95%	18.12%	110.0%	1.05%	-6%	N/A	
110%	3%	0.78%	2.87%	110.0%	0.78%	0%	Yes	
110%	22%	-4.97%	22.15%	110.1%	1.03%	-6%	Yes	
110%	100%	-5.94%	100.65%	110.4%	0.06%	-6%	N/A	
100%	100%	-0.65%	100.58%	100.5%	-0.65%	0%	Yes	
90%	100%	4.69%	99.28%	90.6%	-1.31%	6%	Yes	
90%	18%	5.81%	18.20%	90.1%	-0.19%	6%	N/A	
90%	3%	-0.13%	2.90%	90.0%	-0.13%	0%	Yes	
90%	22%	5.79%	22.16%	90.1%	-0.21%	6%	Yes	
90%	100%	4.69%	99.26%	90.6%	-1.31%	6%	N/A	
100%	100%	-0.66%	100.60%	100.5%	-0.66%	0%	Yes	

Note(s):
P lock-in: 20%Pn; P lock-out: 5%Pn.

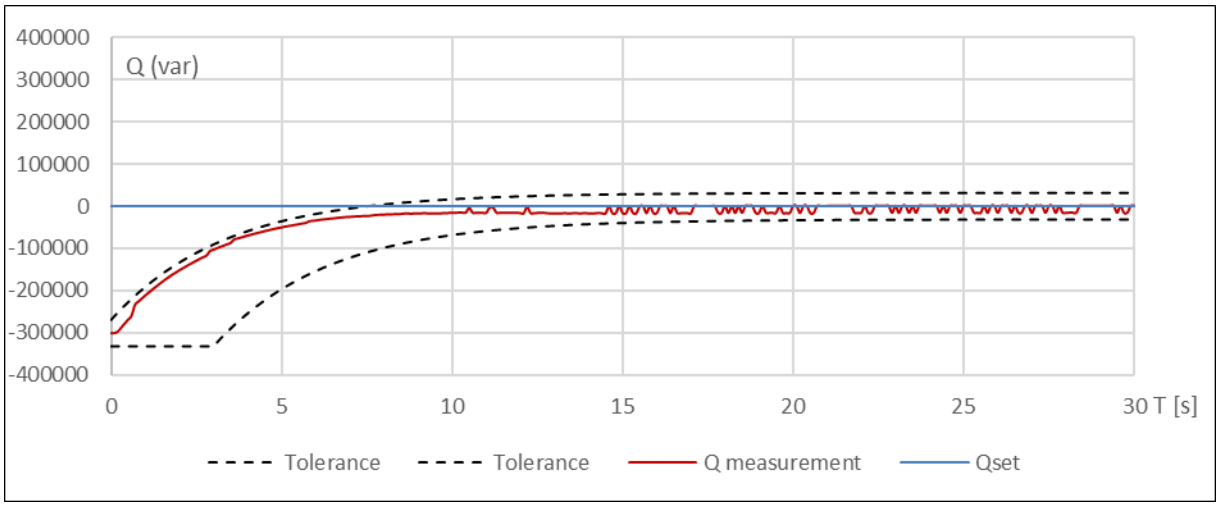
Diagram:
U/Un: 100%-105%



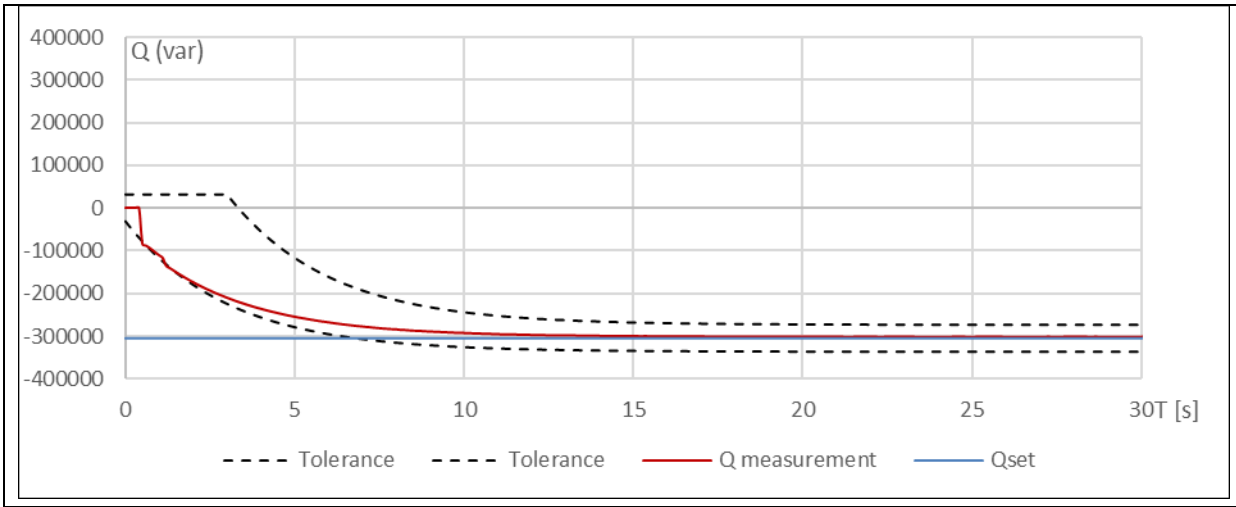
U/Un: 105%-110%



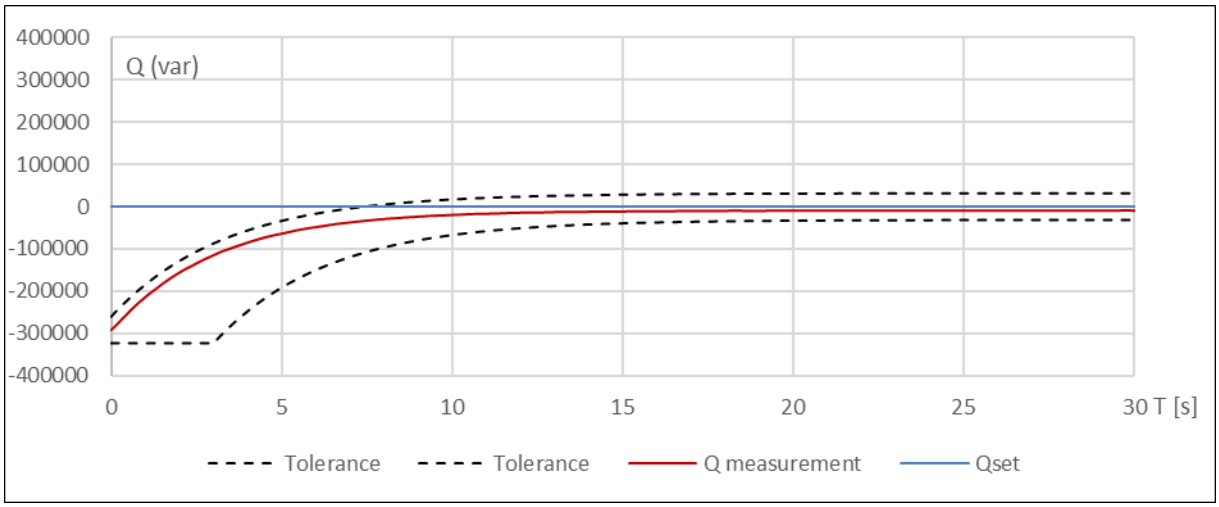
P/Pn:18%-3%



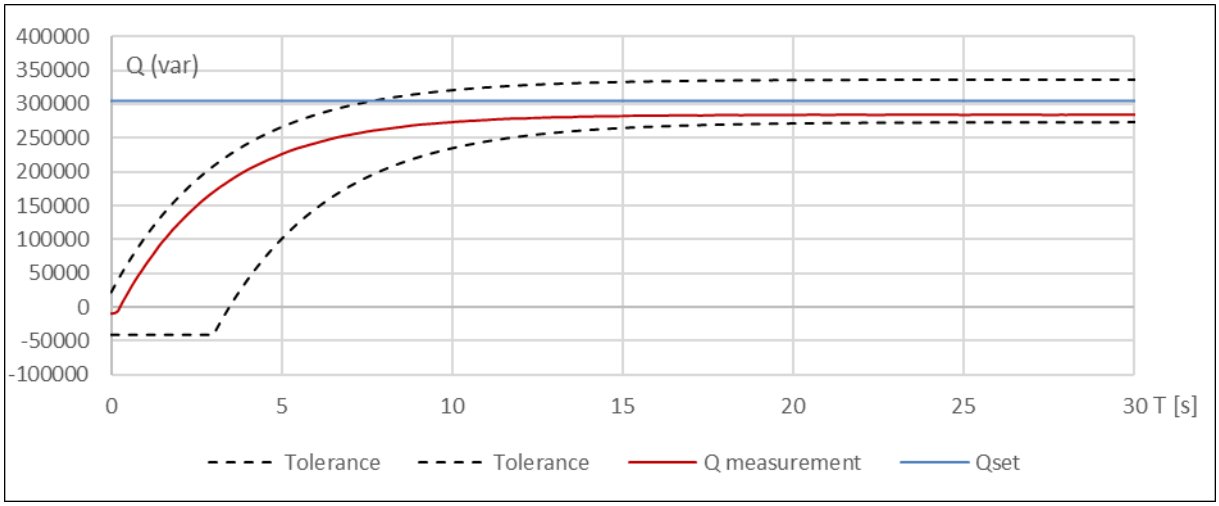
P/Pn:3%-22%



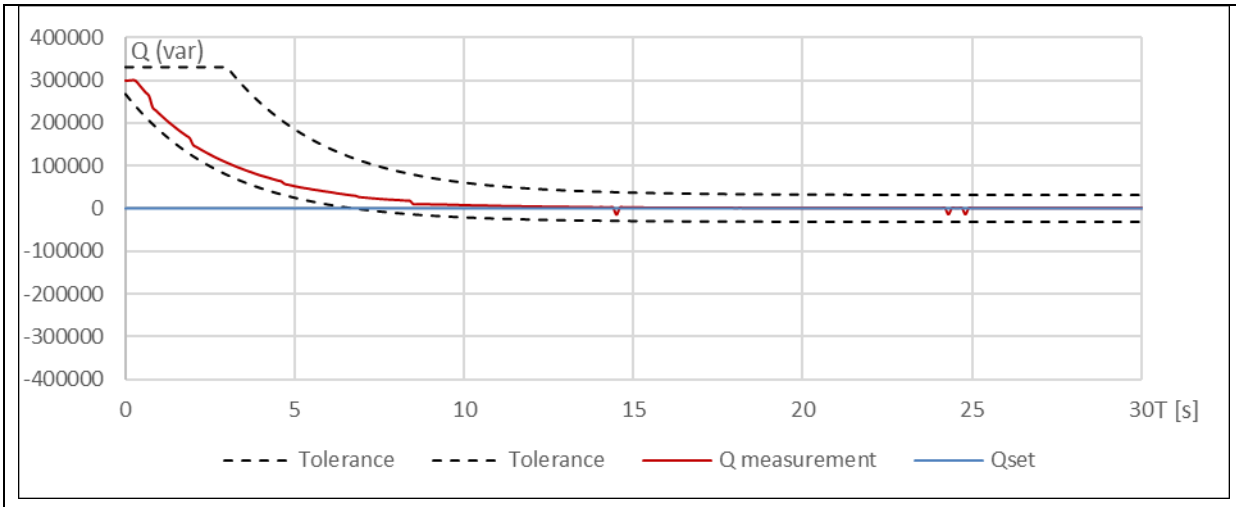
U/Un: 110%-100%



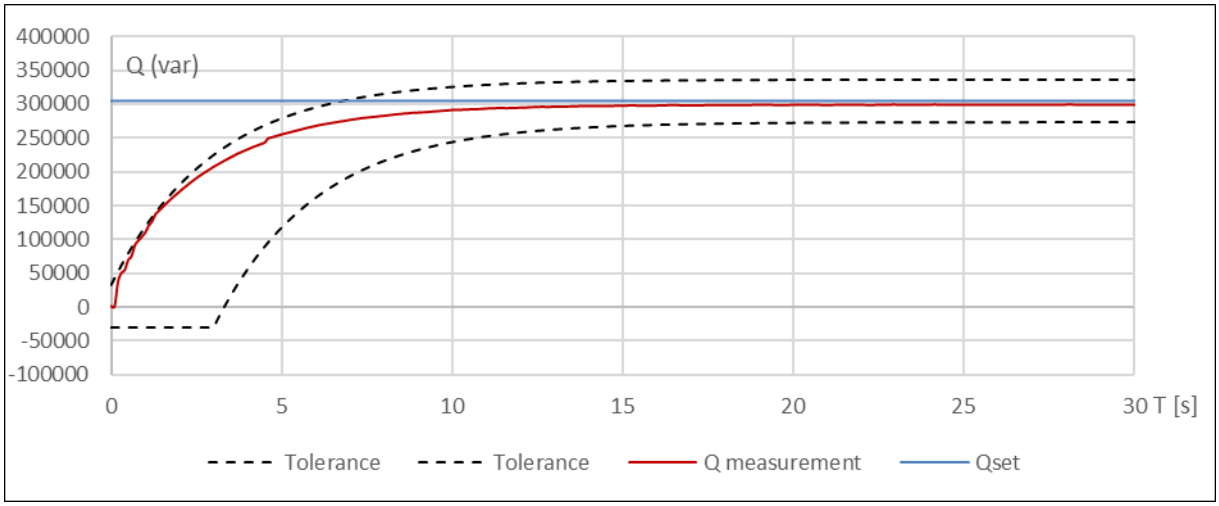
U/Un: 100%-90%



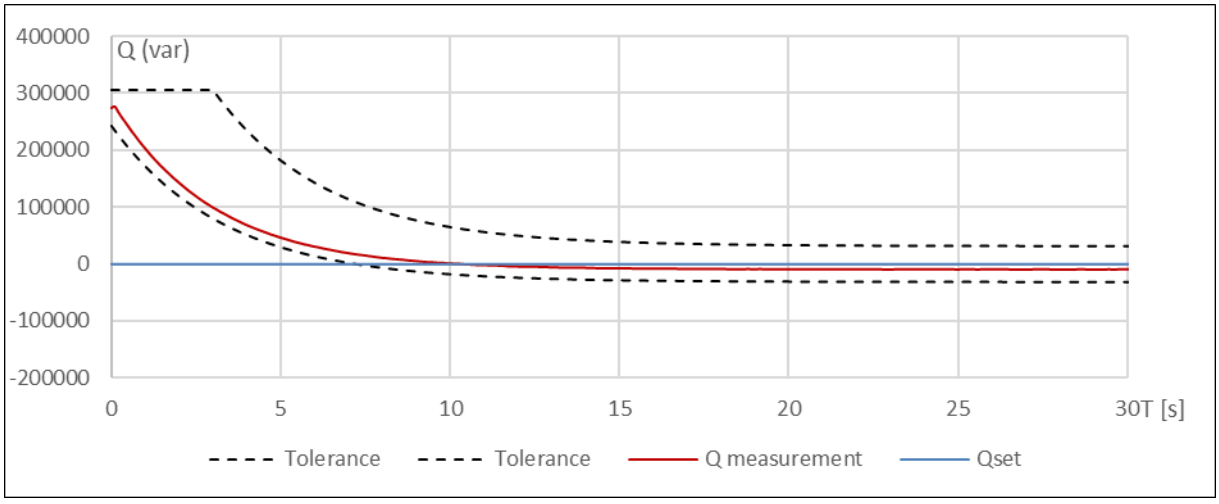
P/Pn:18%-3%



P/Pn:3%-22%



U/Un: 90%-100%



5.5.2.5	TABLE: Verification procedure for power related control modes for reactive power	P

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

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

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

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

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

Setting (c) represents a commonly applied characteristic.

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

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

5.5.2.5.2	Test procedure for quasi-stationary behaviour

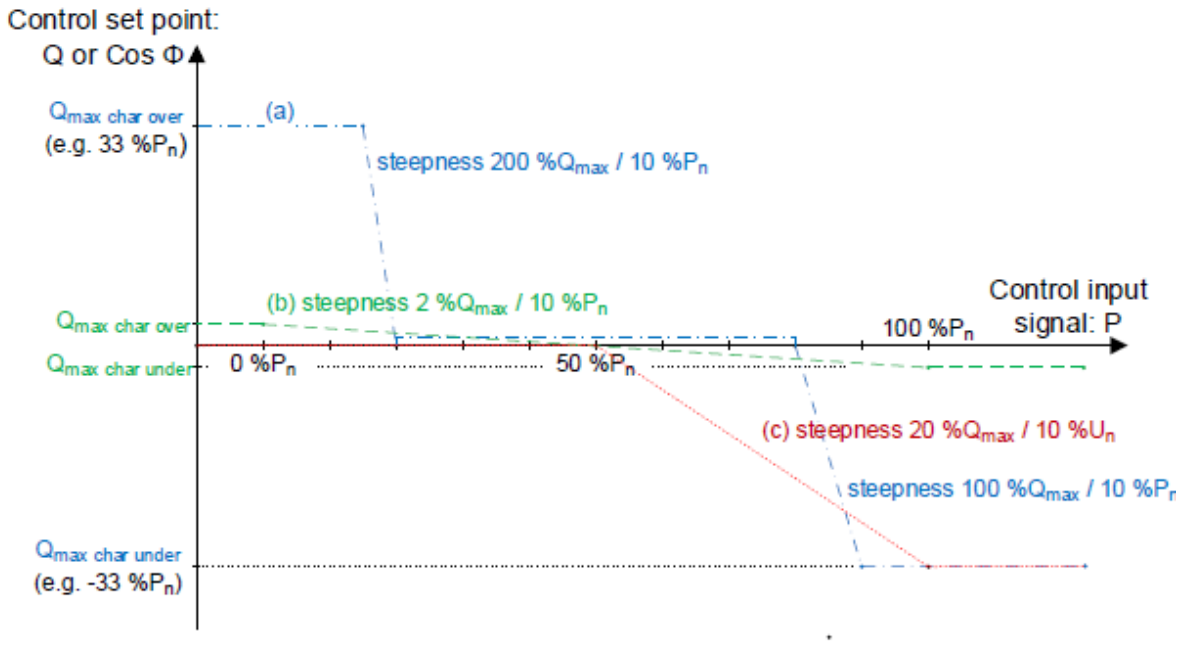


Figure 36 — Q (P) and cos φ (P) and example characteristics for setting (a), (b) and (c) for the test

Setting (a)

cosφ (P) curve settings:	Set points	1	2	3	4
	P/Pn	15%	20%	80%	90%
	Q	100%Q max over	0	0	100%Q max under

Test Conditions		Measurements			Target value	Δ	Δ Limits
P / Pn	U / Un	P / Pn	Q / Pn	cosφ	Q / Pn	Δ Q / Smax	Δ Q / Smax
10%	100%	10.13%	60.39%	0.165	60%	0.39%	±2%
15%	100%	10.13%	60.39%	0.165	60%	0.39%	
20%	100%	20.55%	0.17%	1.000	0	0.17%	
30%	100%	30.11%	0.14%	1.000	0	0.14%	
40%	100%	40.53%	0.06%	1.000	0	0.06%	
50%	100%	50.16%	-0.02%	1.000	0	0.02%	
60%	100%	60.58%	-0.10%	1.000	0	0.10%	
70%	100%	70.19%	-0.19%	1.000	0	0.19%	
80%	100%	80.59%	-0.68%	1.000	0	0.68%	

85%	100%	86.08%	-31.09%	0.940	-30%	1.09%	
90%	100%	90.70%	-48.49%	0.882	-48%	0.49%	
100%	100%	91.38%	-48.95%	0.881	-48%	0.95%	
90%	100%	90.70%	-48.54%	0.882	-48%	0.54%	
85%	100%	86.08%	-31.02%	0.941	-30%	1.02%	
80%	100%	80.59%	-0.42%	1.000	0	0.42%	
70%	100%	70.19%	-0.19%	1.000	0	0.19%	
60%	100%	60.58%	-0.10%	1.000	0	0.10%	
50%	100%	50.16%	-0.01%	1.000	0	0.01%	
40%	100%	40.53%	0.06%	1.000	0	0.06%	
30%	100%	30.12%	0.13%	1.000	0	0.13%	
20%	100%	20.54%	0.18%	1.000	0	0.18%	
15%	100%	14.95%	58.85%	0.246	60%	1.15%	
10%	100%	10.13%	60.39%	0.165	60%	0.39%	

Setting (c)							
cosφ (P) curve settings:	Set points	1	2	3	4		
	P/Pn	20%	40%	50%	100%		
	Q	0	0	0	-Qmax		
Test Conditions		Measurements			Target value	Δ	Δ Limits
P / Pn	U / Un	P / Pn	Q / Pn	cosφ	Q / Pn	Δ Q / Smax	Δ Q / Smax
10%	100%	10.10%	0.24%	0.999	0	0.24%	
20%	100%	20.54%	0.18%	1.000	0	0.18%	
30%	100%	30.12%	0.14%	1.000	0	0.14%	
40%	100%	40.54%	0.06%	1.000	0	0.06%	
50%	100%	50.16%	-0.01%	1.000	0	0.01%	
60%	100%	60.56%	-12.15%	0.980	-12%	0.15%	±2%
70%	100%	70.12%	-23.83%	0.947	-24%	0.17%	
80%	100%	80.48%	-36.54%	0.911	-36%	0.54%	
90%	100%	90.02%	-48.31%	0.881	-48%	0.31%	
100%	100%	91.44%	-48.98%	0.882	-48%	0.98%	
90%	100%	90.03%	-48.34%	0.881	-48%	0.34%	

80%	100%	80.48%	-36.57%	0.910	-36%	0.57%	
70%	100%	70.13%	-23.85%	0.947	-24%	0.15%	
60%	100%	60.56%	-12.16%	0.980	-12%	0.16%	
50%	100%	50.17%	-0.01%	1.000	0	0.01%	
40%	100%	40.55%	0.06%	1.000	0	0.06%	
30%	100%	30.13%	0.15%	1.000	0	0.15%	
20%	100%	20.55%	0.18%	1.000	0	0.18%	
10%	100%	10.11%	0.23%	0.999	0	0.23%	

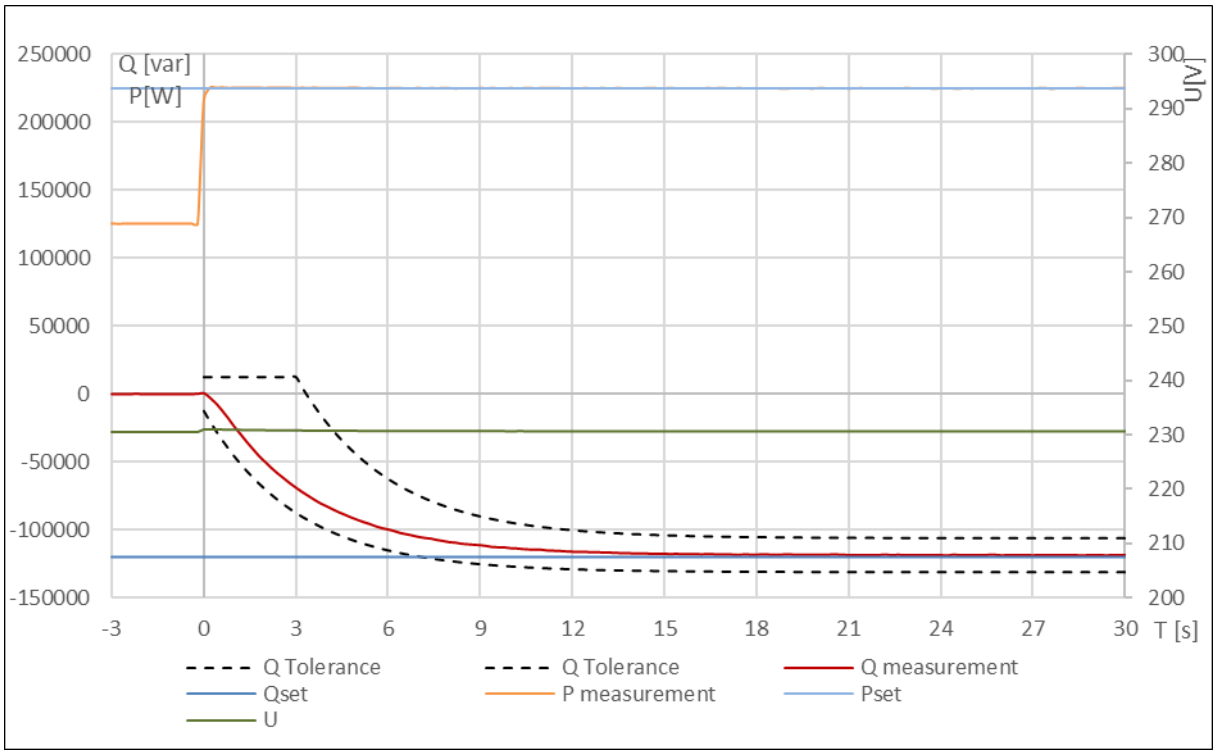
5.5.2.5.3	Test procedure for dynamic behaviour

Setting (a)-Time constant: as fast as possible but not slower as 3s-3s

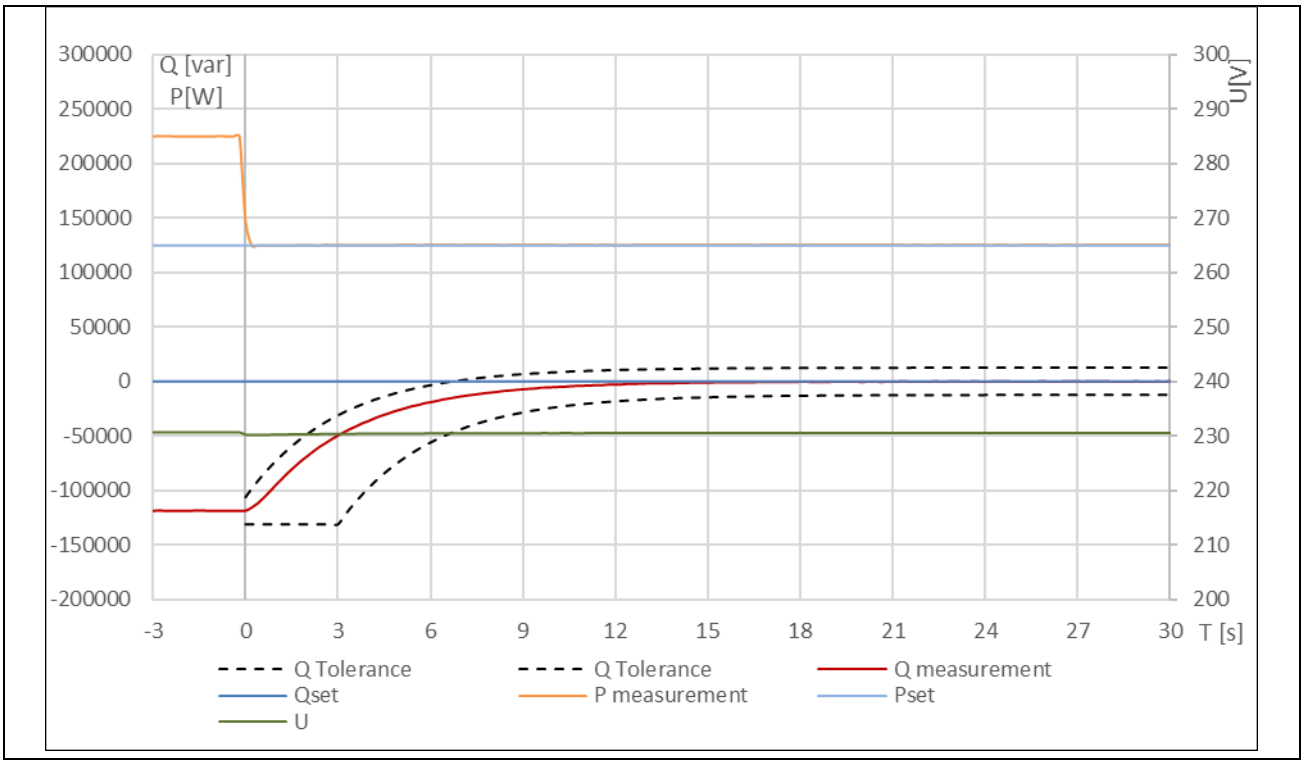
Test Conditions	Measurements					
	Tsr [s]	Ts [s]	Td [s]	Reactive power/Pn [%]	Active power/Pn [%]	Grid voltage/Un [%]
20%Pn	--	--	--	0.19%	20.57%	100.04%
20%Pn -> 50%Pn	--	--	--	0.07%	50.19%	100.17%
50%Pn -> 90%Pn	8.7	8.7	0.2	-47.41%	90.10%	100.30%
90%Pn -> 50%Pn	8.6	8.6	0.2	-30.02%	50.20%	100.17%
50%Pn -> 20%Pn	--	--	--	0.13%	50.25%	100.22%

Diagram:

50%Pn -> 90%Pn:



90%Pn -> 50%Pn:

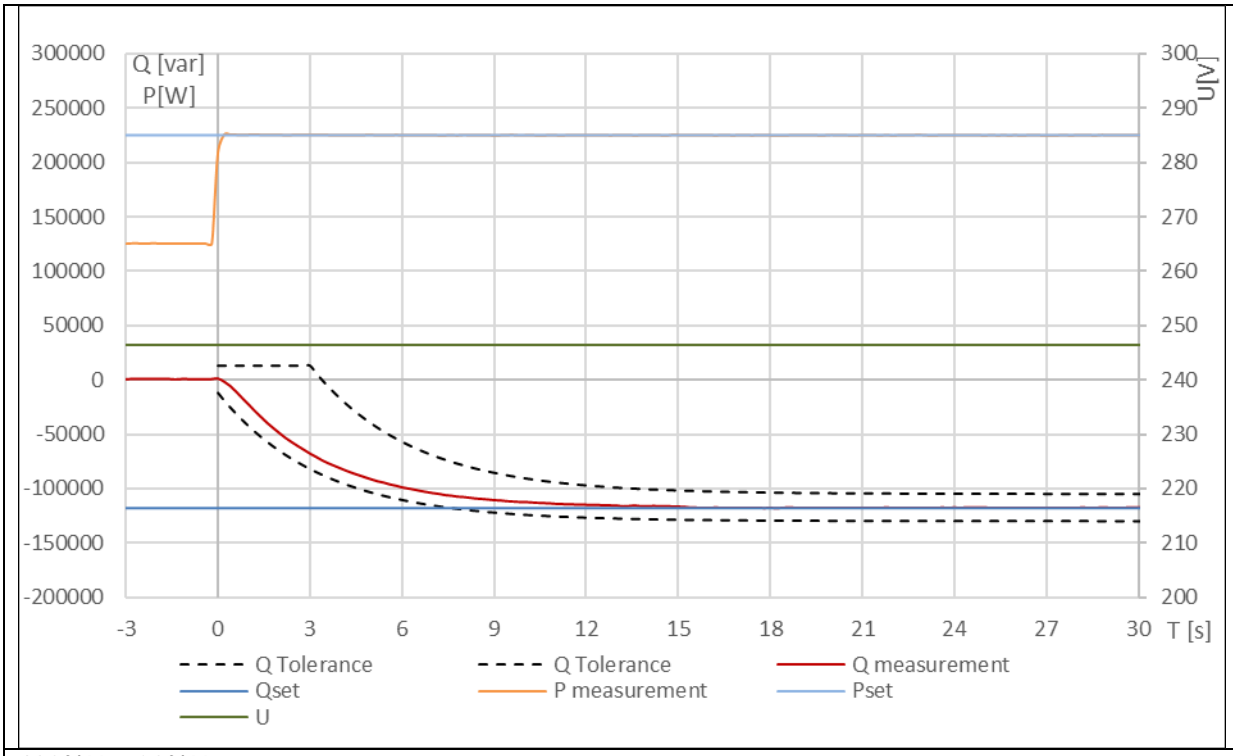


Setting (c)--Time constant: 3.33s							
Test Conditions		Measurements					
P	U/Un	Tsr [s]	Ts [s]	Td [s]	Reactive power [var]	Active power [W]	Grid voltage [V]
20%Pn	107%	--	--	--	1274.5	51440.2	246.1
20%Pn -> 50%Pn	107%	--	--	--	858.5	125464.2	246.5
50%Pn -> 90%Pn	107%	9.4	9.4	0.1	-117572.9	225119.4	246.6
90%	103%	--	--	--	-118213.5	225030.8	236.7
90%	98%	9.2	9.2	0.2	-1283.4	225466.0	226.0
90%	107%	9.4	9.4	0.2	-118183.8	225119.2	246.6
90%	100%	--	--	--	-118711.7	224950.1	230.7
90%Pn -> 50%Pn	100%	9.5	9.5	0.2	-94.3	125443.4	230.5
50%Pn -> 20%Pn	100%	--	--	--	474.0	51368.1	230.2

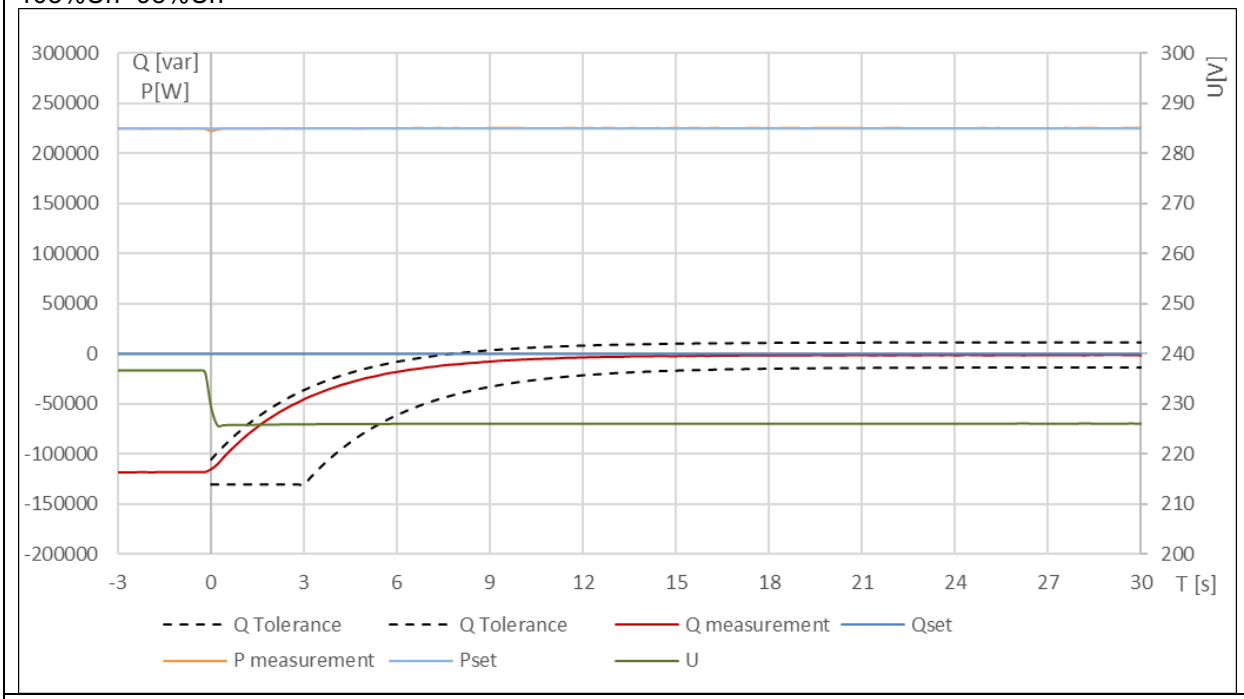
Diagram:

– Graph showing the measured reactive power, active power and grid voltage as 10-period averages, together with the calculated dynamic tolerance bands (see e.g. Figure 32) for each step.

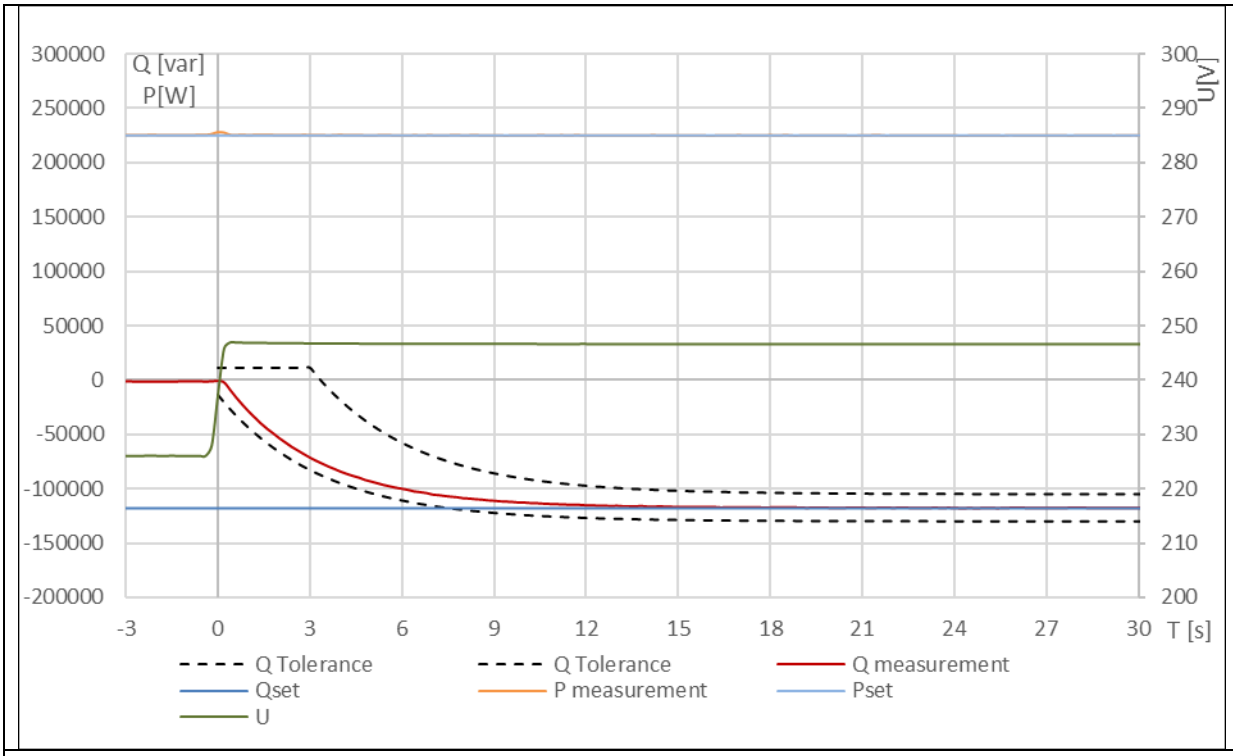
50%Pn -> 90%Pn:



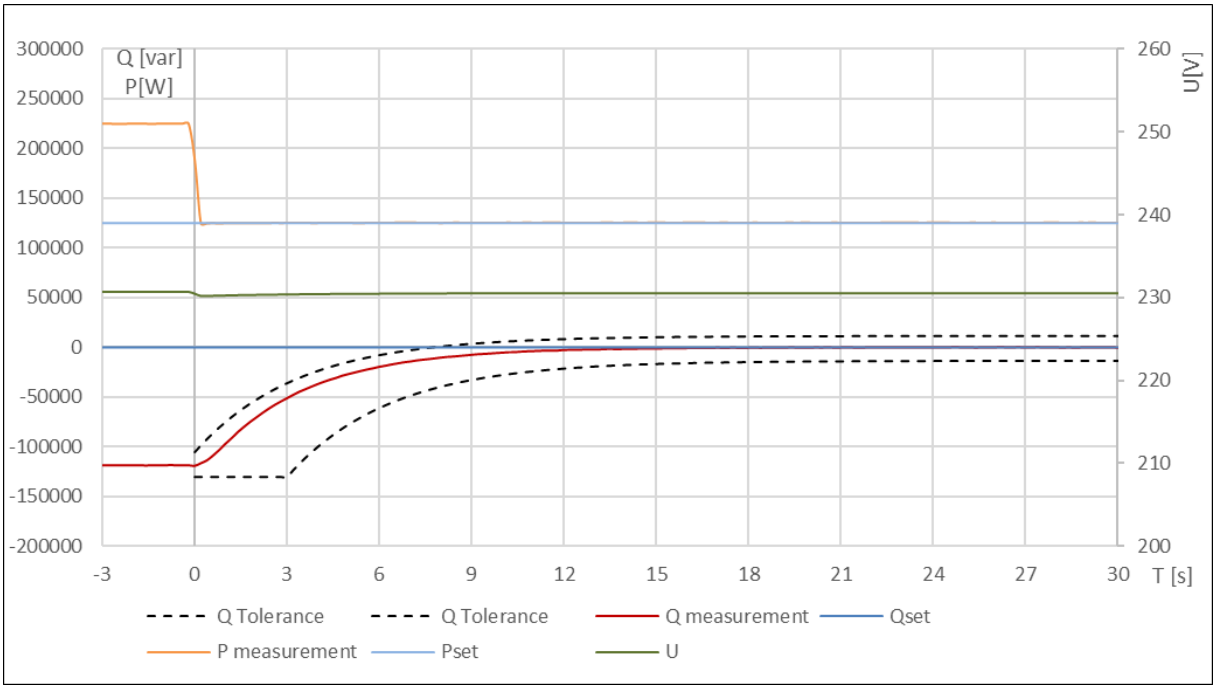
103%Un -98%Un



98%Un -107%Un



90%Pn -> 50%Pn



Lock-in voltage: 105%Un
Lock out voltage: 100%Un

5.6	TABLE: Voltage related active power reduction - P(U)		P
P(U) curve settings:	Set points	1	2
	U/Un	110%	115%
	P/Pn	100%	0%
	Q(U) function activated and configured the QU function to **setting (a)**.		

Set·points¤	X1¤	X2¤	X3¤	X4¤
U/Un¤	93%¤	94%¤	106%¤	108%¤
Q/Qmax¤	100%¤	0¤	0¤	-100%¤

Test procedure for steady-state behaviour

Test Conditions		Measurements			Target value		Δ		Δ Limits	
U/Un	P/Pn	P/Pn	Q/Pn	U/Un	P/Pn	Q/Pn	ΔP/Smax	ΔQ/Smax	ΔP/Smax	ΔQ/Smax
100%	100 %	100.13%	-0.41%	100.5%	100%	0%	0.13%	-0.41%	≤ ±2%	≤ ±2%
103%		100.15%	-0.25%	103.5%	100%	0%	0.15%	-0.25%		
106%		100.17%	-0.28%	106.3%	100%	0%	0.17%	-0.28%		
109%		92.12%	-60.35%	109.2%	100%*	-60%*	-7.88%	-0.35%		
112%		60.33%	-59.81%	112.8%	60%	-60%*	0.33%	0.19%		
115%		1.40%	-59.28%	115.9%	0%	-60%**	1.40%	0.72%		
112%		60.22%	-59.80%	112.8%	60%	-60%*	0.22%	0.20%		
109%		92.10%	-60.34%	109.2%	100%*	-60%*	-7.90%	-0.34%		
106%		100.14%	-0.28%	103.5%	100%	0%	0.14%	-0.28%		
103%		100.14%	-0.47%	106.3%	100%	0%	0.14%	-0.47%		
100%		100.12%	-0.45%	100.5%	100%	0%	0.12%	-0.45%		

Note:

*: Due to the influence of the maximum current limit, it is allowed to reduce the active power under the condition that I reaches Imax.

**: It is acceptable If Q has not reached the target value, but has already reached the maximum capacity value.

Test procedure:

Test procedure for dynamic behaviour-Tau ≥3s (eg.5s) P: 5 s (3τ = 15 s); Q: 5 s (3τ = 15 s) 3.33S

P=100%Pn

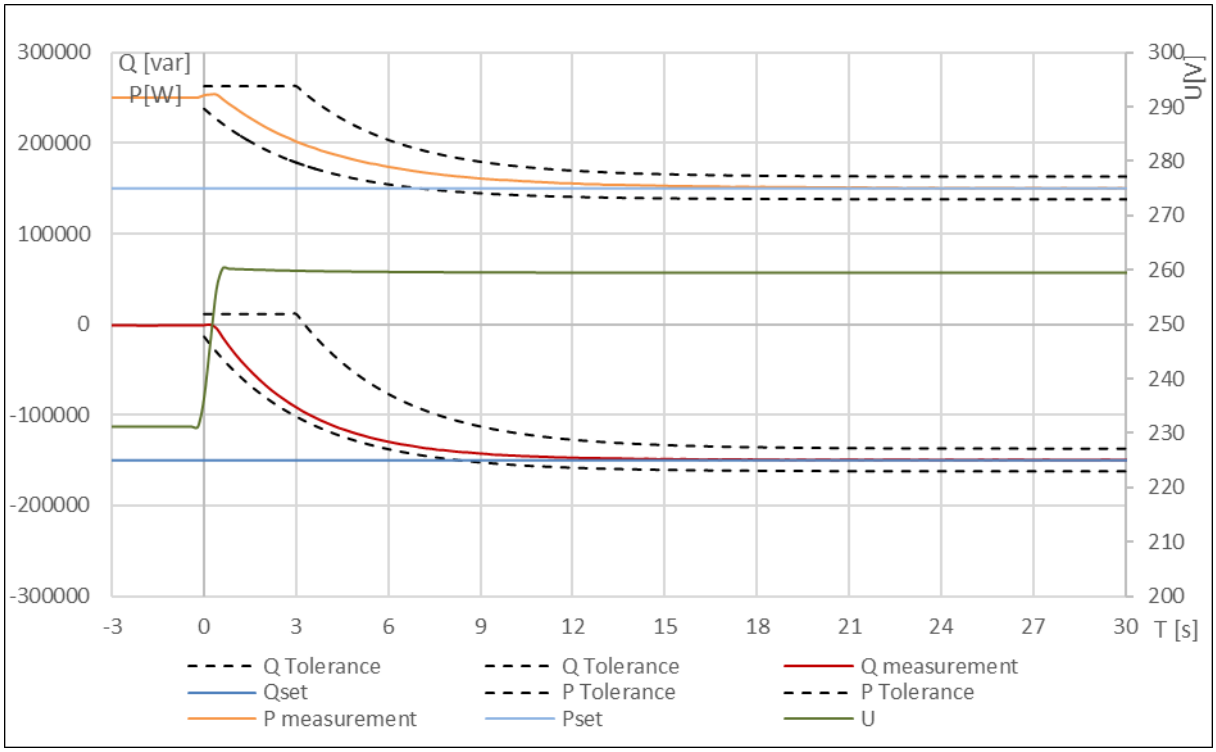
Q(U) function activated and configured the QU function to **setting (a)**.

Test Conditions	Measurements					
	Dead time		response time		settling time	
	P	Q	P	Q	P	Q
100%Un -> 112.5%Un	0.4	0.4	9.2	9.4	9.2	9.4
112.5%Un -> 115%Un	0.2	--	9.9	--	9.9	--
115%Un -> 112.5%Un	0.2	--	10.0	--	10.0	--
112.5%Un -> 100%Un	0.4	0.2	8.6	8.4	8.6	8.4

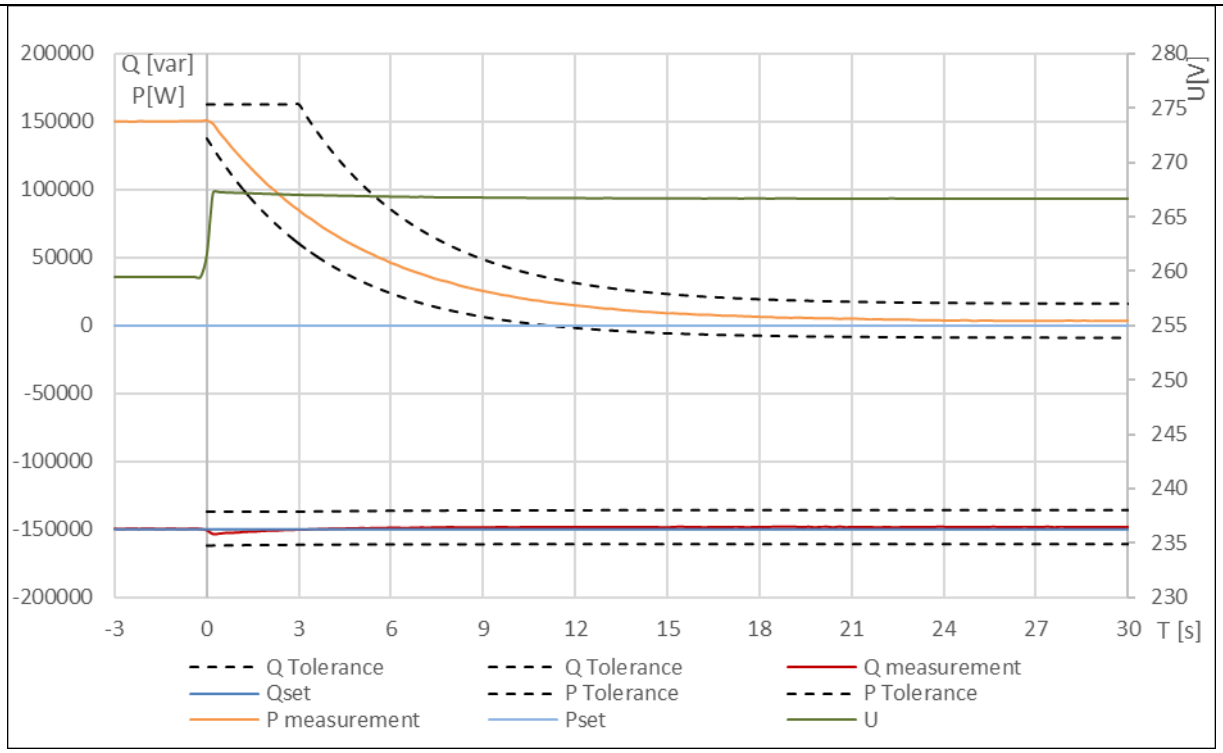
Diagram:

Graph showing the measured active power, reactive power and grid voltage as 10-period averages, together with the calculated dynamic tolerance bands (see e.g. Figure 32) for each step.

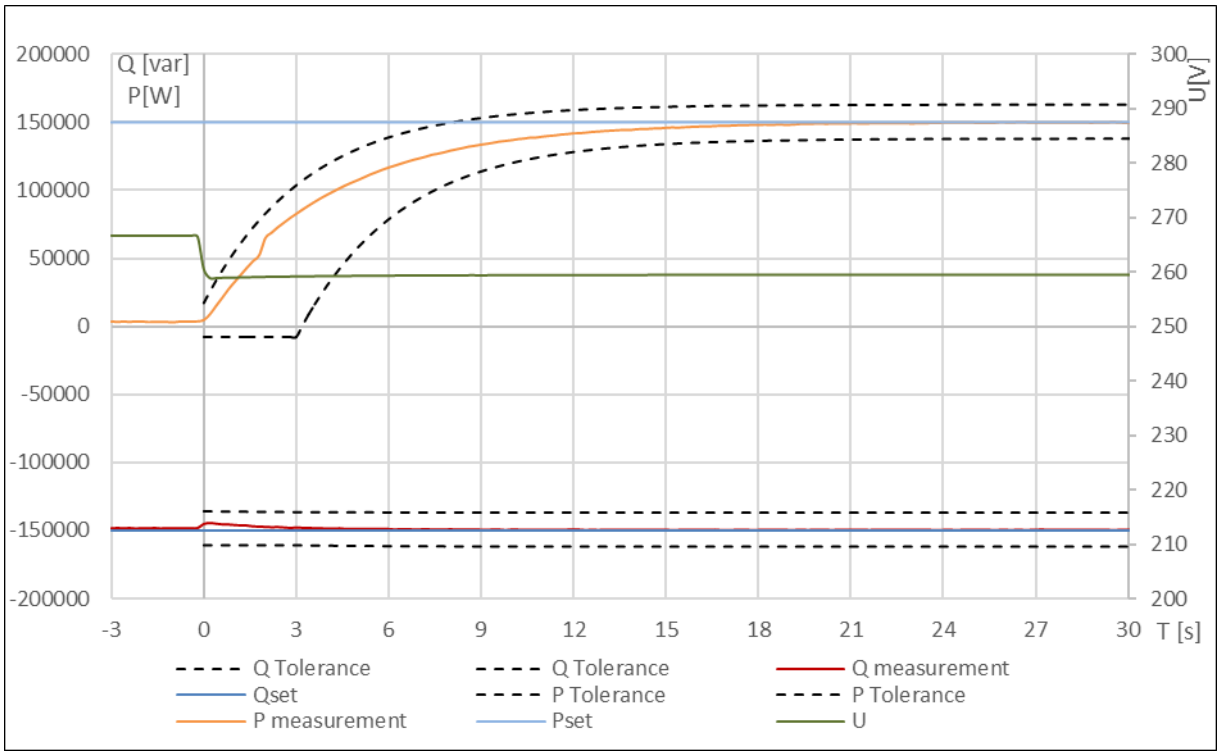
100%Un -> 112.5%Un:



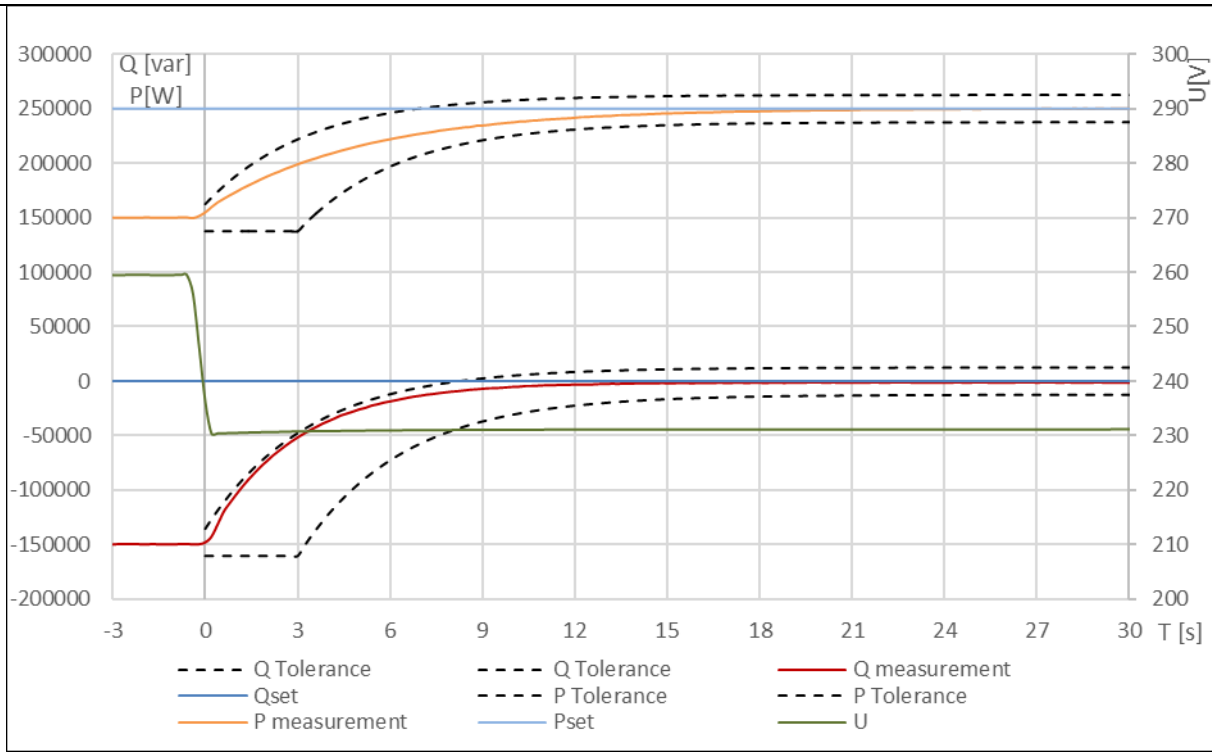
112.5%Un -> 115%Un:



115%Un -> 112.5%Un:



112.5%Un -> 100%Un:


Q [var]
P[W]
U[V]
300000
250000
200000
150000
100000
50000
0
-50000
-100000
-150000
-200000
300
290
280
270
260
250
240
230
220
210
200
-3
0
3
6
9
12
15
18
21
24
27
30
T [s]
Q Tolerance
Qset
P measurement
Q Tolerance
P Tolerance
Pset
Q measurement
P Tolerance
U

5.7.2	Power Quality	P
5.7.2.2.1	TABLE: Harmonics, Inter-harmonics, and Higher frequency harmonics (Iinter & Ihigher)	P

Harmonics

P/P_n [%]	0	10	20	30	40	50	60	70	80	90	100	Limit
Order No.	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]
THC	0.62	0.64	0.72	0.75	0.83	0.93	1.01	1.08	1.14	1.19	1.22	--
1	0.573	10.138	20.589	30.180	40.582	50.185	60.588	70.188	80.575	90.153	100.118	--
2	0.111	0.111	0.105	0.106	0.116	0.116	0.121	0.125	0.119	0.124	0.124	--
3	0.214	0.220	0.225	0.259	0.417	0.474	0.496	0.497	0.505	0.500	0.500	--
4	0.112	0.114	0.104	0.116	0.121	0.129	0.134	0.135	0.136	0.133	0.135	--
5	0.186	0.167	0.272	0.137	0.226	0.346	0.415	0.448	0.464	0.476	0.480	--
6	0.127	0.112	0.108	0.117	0.134	0.131	0.135	0.143	0.140	0.136	0.133	--
7	0.174	0.165	0.293	0.250	0.215	0.262	0.329	0.365	0.373	0.384	0.392	--
8	0.099	0.113	0.110	0.119	0.125	0.133	0.137	0.136	0.137	0.142	0.144	--
9	0.162	0.168	0.156	0.310	0.242	0.226	0.281	0.325	0.351	0.350	0.354	--
10	0.092	0.102	0.101	0.111	0.115	0.125	0.123	0.121	0.119	0.127	0.122	--
11	0.133	0.138	0.140	0.176	0.195	0.163	0.188	0.216	0.235	0.250	0.258	--
12	0.085	0.092	0.086	0.096	0.099	0.103	0.105	0.109	0.103	0.103	0.107	--
13	0.124	0.141	0.141	0.147	0.182	0.169	0.164	0.195	0.216	0.238	0.239	--
14	0.071	0.075	0.078	0.088	0.086	0.093	0.096	0.091	0.091	0.089	0.093	--
15	0.119	0.138	0.100	0.153	0.152	0.181	0.165	0.198	0.228	0.247	0.255	--
16	0.069	0.076	0.073	0.079	0.077	0.082	0.079	0.084	0.084	0.082	0.080	--
17	0.104	0.113	0.106	0.109	0.117	0.149	0.138	0.155	0.185	0.203	0.211	--
18	0.070	0.075	0.073	0.081	0.079	0.081	0.083	0.081	0.082	0.085	0.080	--
19	0.102	0.126	0.145	0.101	0.150	0.174	0.145	0.157	0.184	0.205	0.219	--
20	0.076	0.080	0.080	0.085	0.088	0.088	0.092	0.089	0.089	0.092	0.113	--
21	0.115	0.112	0.124	0.100	0.113	0.132	0.154	0.169	0.197	0.238	0.260	--
22	0.082	0.091	0.096	0.103	0.111	0.110	0.105	0.104	0.104	0.106	0.102	--
23	0.119	0.132	0.149	0.132	0.133	0.151	0.191	0.203	0.248	0.289	0.309	--
24	0.083	0.097	0.097	0.107	0.110	0.113	0.112	0.114	0.118	0.120	0.114	--
25	0.112	0.128	0.138	0.134	0.128	0.136	0.159	0.167	0.187	0.217	0.246	--
26	0.072	0.082	0.081	0.095	0.106	0.087	0.090	0.093	0.101	0.156	0.102	--
27	0.075	0.079	0.078	0.086	0.082	0.082	0.087	0.087	0.097	0.105	0.115	--
28	0.056	0.057	0.054	0.060	0.064	0.064	0.064	0.065	0.067	0.066	0.065	--
29	0.064	0.070	0.075	0.075	0.070	0.069	0.071	0.077	0.080	0.088	0.100	--
30	0.047	0.044	0.039	0.044	0.045	0.044	0.045	0.046	0.048	0.047	0.048	--
31	0.050	0.054	0.050	0.058	0.055	0.057	0.058	0.059	0.059	0.064	0.070	--
32	0.038	0.034	0.033	0.036	0.036	0.036	0.037	0.037	0.038	0.036	0.036	--
33	0.038	0.035	0.034	0.040	0.043	0.045	0.045	0.045	0.044	0.046	0.047	--
34	0.034	0.031	0.027	0.029	0.030	0.030	0.031	0.031	0.031	0.032	0.031	--
35	0.038	0.032	0.032	0.040	0.044	0.046	0.045	0.046	0.046	0.044	0.047	--
36	0.032	0.027	0.023	0.025	0.026	0.026	0.026	0.027	0.026	0.026	0.028	--
37	0.036	0.028	0.027	0.033	0.039	0.041	0.044	0.045	0.045	0.046	0.046	--
38	0.031	0.024	0.022	0.023	0.024	0.025	0.024	0.024	0.024	0.024	0.026	--

Harmonics												
P/P_n [%]	0	10	20	30	40	50	60	70	80	90	100	Limit
Order No.	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]
39	0.032	0.025	0.022	0.025	0.030	0.035	0.037	0.037	0.038	0.040	0.036	--
40	0.030	0.024	0.021	0.023	0.023	0.022	0.023	0.023	0.025	0.024	0.023	--
41	0.035	0.027	0.023	0.027	0.031	0.036	0.038	0.039	0.039	0.041	0.040	--
42	0.030	0.023	0.021	0.021	0.023	0.023	0.023	0.023	0.024	0.023	0.022	--
43	0.036	0.028	0.023	0.025	0.030	0.033	0.035	0.037	0.040	0.041	0.041	--
44	0.029	0.024	0.022	0.022	0.023	0.023	0.023	0.024	0.023	0.024	0.023	--
45	0.031	0.026	0.023	0.023	0.026	0.028	0.031	0.034	0.033	0.032	0.033	--
46	0.030	0.025	0.022	0.023	0.024	0.024	0.024	0.025	0.024	0.024	0.025	--
47	0.035	0.029	0.025	0.025	0.028	0.029	0.031	0.033	0.036	0.038	0.038	--
48	0.028	0.024	0.022	0.024	0.025	0.024	0.026	0.026	0.025	0.025	0.025	--
49	0.032	0.028	0.025	0.024	0.026	0.027	0.030	0.033	0.034	0.037	0.038	--
50	0.025	0.022	0.020	0.021	0.024	0.022	0.023	0.022	0.023	0.023	0.026	--

Inter-harmonics												
P/P_n [%]	0	10	20	30	40	50	60	70	80	90	100	Limit
f [Hz]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]
75	0.184	0.150	0.130	0.137	0.143	0.149	0.150	0.152	0.152	0.155	0.155	--
125	0.177	0.149	0.132	0.139	0.146	0.148	0.150	0.154	0.154	0.155	0.155	--
175	0.152	0.138	0.127	0.134	0.140	0.141	0.142	0.144	0.145	0.147	0.149	--
225	0.105	0.103	0.101	0.106	0.110	0.110	0.111	0.111	0.112	0.114	0.116	--
275	0.062	0.063	0.062	0.066	0.068	0.068	0.067	0.069	0.070	0.070	0.072	--
325	0.034	0.035	0.034	0.037	0.038	0.038	0.038	0.038	0.038	0.039	0.039	--
375	0.018	0.018	0.018	0.019	0.020	0.020	0.020	0.021	0.021	0.021	0.021	--
425	0.010	0.010	0.010	0.011	0.012	0.012	0.012	0.012	0.012	0.012	0.013	--
475	0.006	0.007	0.007	0.007	0.008	0.008	0.008	0.008	0.008	0.008	0.009	--
525	0.005	0.005	0.005	0.006	0.006	0.006	0.006	0.007	0.007	0.007	0.007	--
575	0.004	0.004	0.005	0.005	0.005	0.005	0.006	0.006	0.006	0.006	0.006	--
625	0.004	0.004	0.004	0.005	0.005	0.005	0.005	0.006	0.006	0.006	0.006	--
675	0.004	0.004	0.004	0.005	0.005	0.005	0.005	0.005	0.006	0.005	0.006	--
725	0.004	0.004	0.004	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.006	--
775	0.004	0.004	0.004	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.006	--
825	0.001	0.000	0.002	0.000	0.001	0.001	0.001	0.001	0.001	0.002	0.001	--
875	0.004	0.003	0.006	0.002	0.003	0.003	0.006	0.005	0.005	0.005	0.005	--
925	0.004	0.003	0.006	0.002	0.003	0.003	0.006	0.005	0.005	0.005	0.005	--
975	0.004	0.003	0.006	0.002	0.003	0.003	0.006	0.005	0.005	0.005	0.005	--
1025	0.003	0.003	0.006	0.002	0.003	0.002	0.006	0.004	0.004	0.005	0.005	--
1075	0.003	0.003	0.006	0.002	0.003	0.002	0.006	0.004	0.004	0.005	0.005	--
1125	0.003	0.003	0.006	0.002	0.003	0.002	0.006	0.004	0.004	0.005	0.005	--
1175	0.003	0.003	0.006	0.002	0.003	0.002	0.006	0.004	0.004	0.005	0.005	--
1225	0.003	0.003	0.006	0.002	0.003	0.002	0.006	0.004	0.004	0.005	0.005	--
1275	0.004	0.003	0.006	0.002	0.003	0.003	0.006	0.004	0.004	0.005	0.005	--

Inter-harmonics												
P/P_n [%]	0	10	20	30	40	50	60	70	80	90	100	Limit
f [Hz]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]
1325	0.003	0.003	0.006	0.003	0.003	0.003	0.006	0.004	0.005	0.005	0.005	--
1375	0.004	0.003	0.006	0.003	0.003	0.003	0.006	0.004	0.005	0.005	0.005	--
1425	0.004	0.004	0.006	0.003	0.003	0.003	0.006	0.005	0.005	0.005	0.005	--
1475	0.004	0.004	0.006	0.003	0.003	0.003	0.005	0.004	0.004	0.005	0.004	--
1525	0.004	0.003	0.005	0.002	0.002	0.002	0.005	0.004	0.004	0.004	0.004	--
1575	0.003	0.003	0.005	0.002	0.002	0.002	0.005	0.004	0.004	0.004	0.004	--
1625	0.003	0.003	0.005	0.002	0.002	0.002	0.005	0.004	0.004	0.004	0.004	--
1675	0.003	0.003	0.005	0.002	0.002	0.002	0.005	0.004	0.004	0.004	0.004	--
1725	0.003	0.003	0.005	0.002	0.002	0.002	0.005	0.004	0.004	0.004	0.004	--
1775	0.003	0.003	0.005	0.002	0.002	0.002	0.005	0.004	0.004	0.004	0.004	--
1825	0.184	0.150	0.130	0.137	0.143	0.149	0.150	0.152	0.152	0.155	0.155	--
1875	0.177	0.149	0.132	0.139	0.146	0.148	0.150	0.154	0.154	0.155	0.155	--
1925	0.152	0.138	0.127	0.134	0.140	0.141	0.142	0.144	0.145	0.147	0.149	--
1975	0.105	0.103	0.101	0.106	0.110	0.110	0.111	0.111	0.112	0.114	0.116	--

Higher frequency harmonics												
P/P_n [%]	0	10	20	30	40	50	60	70	80	90	100	Limit
f [kHz]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]
2.1	0.603	0.598	0.527	0.603	0.673	0.705	0.734	0.747	0.763	0.772	0.773	--
2.3	0.526	0.534	0.490	0.547	0.599	0.626	0.643	0.654	0.659	0.667	0.674	--
2.5	0.619	0.609	0.543	0.626	0.708	0.736	0.770	0.788	0.805	0.815	0.817	--
2.7	0.561	0.582	0.522	0.601	0.651	0.684	0.710	0.730	0.741	0.756	0.758	--
2.9	0.485	0.522	0.491	0.545	0.587	0.612	0.629	0.648	0.654	0.654	0.656	--
3.1	0.499	0.526	0.477	0.520	0.577	0.611	0.614	0.624	0.615	0.626	0.632	--
3.3	0.391	0.418	0.431	0.469	0.481	0.498	0.509	0.510	0.514	0.514	0.522	--
3.5	0.349	0.382	0.378	0.415	0.439	0.450	0.458	0.461	0.459	0.456	0.468	--
3.7	0.319	0.345	0.340	0.374	0.397	0.405	0.414	0.411	0.417	0.411	0.416	--
3.9	0.296	0.319	0.316	0.347	0.353	0.368	0.369	0.375	0.380	0.373	0.381	--
4.1	0.274	0.289	0.286	0.311	0.324	0.335	0.336	0.337	0.341	0.342	0.341	--
4.3	0.261	0.279	0.272	0.291	0.312	0.324	0.318	0.325	0.326	0.311	0.317	--
4.5	0.240	0.250	0.253	0.270	0.285	0.287	0.282	0.289	0.289	0.292	0.301	--
4.7	0.231	0.244	0.250	0.261	0.268	0.273	0.272	0.276	0.274	0.276	0.278	--
4.9	0.223	0.231	0.232	0.247	0.254	0.263	0.263	0.265	0.262	0.267	0.264	--
5.1	0.222	0.230	0.232	0.244	0.255	0.258	0.256	0.261	0.260	0.263	0.256	--
5.3	0.223	0.227	0.231	0.243	0.251	0.254	0.253	0.257	0.255	0.255	0.254	--
5.5	0.252	0.258	0.253	0.252	0.276	0.283	0.267	0.266	0.269	0.263	0.267	--
5.7	0.237	0.249	0.244	0.271	0.289	0.279	0.297	0.303	0.307	0.308	0.314	--
5.9	0.250	0.262	0.266	0.284	0.293	0.294	0.300	0.303	0.297	0.298	0.298	--
6.1	0.278	0.294	0.299	0.301	0.310	0.316	0.316	0.316	0.317	0.317	0.313	--
6.3	0.274	0.313	0.312	0.353	0.365	0.357	0.372	0.373	0.378	0.375	0.363	--
6.5	0.278	0.319	0.310	0.336	0.355	0.358	0.364	0.368	0.370	0.365	0.372	--

Higher frequency harmonics												
P/P_n [%]	0	10	20	30	40	50	60	70	80	90	100	Limit
f [kHz]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]	| [%]
6.7	0.336	0.360	0.320	0.340	0.362	0.373	0.372	0.369	0.372	0.373	0.371	--
6.9	0.261	0.324	0.319	0.340	0.373	0.404	0.420	0.427	0.422	0.351	0.338	--
7.1	0.237	0.260	0.250	0.274	0.299	0.285	0.293	0.296	0.302	0.333	0.368	--
7.3	0.213	0.216	0.208	0.222	0.232	0.234	0.238	0.239	0.247	0.245	0.245	--
7.5	0.185	0.184	0.192	0.191	0.195	0.197	0.201	0.202	0.203	0.207	0.209	--
7.7	0.165	0.157	0.146	0.161	0.162	0.163	0.166	0.169	0.171	0.172	0.172	--
7.9	0.149	0.140	0.127	0.139	0.140	0.143	0.144	0.146	0.149	0.149	0.149	--
8.1	0.133	0.120	0.109	0.117	0.122	0.125	0.124	0.126	0.127	0.129	0.128	--
8.3	0.122	0.110	0.099	0.104	0.109	0.110	0.112	0.115	0.115	0.116	0.115	--
8.5	0.112	0.098	0.087	0.094	0.096	0.098	0.100	0.102	0.103	0.103	0.102	--
8.7	0.105	0.092	0.082	0.085	0.089	0.092	0.092	0.093	0.094	0.094	0.094	--
8.9	0.099	0.084	0.075	0.078	0.080	0.083	0.084	0.085	0.085	0.085	0.089	--

Note(s):
Each phase output current > 75A, The harmonic currents are measured per EN 61000-4-7+A1.
The worst value of three phases shall be determined.

5.7.2.3.3	Flicker - Generation units with a rated current > 75 A	P

Grid impedance angle, ψk: 30°

Measurement	Plt	0.02872	
	P/Pn [%]	Pst	CΨk
1	10	0.012448	0.18672
2	20	0.012464	0.18696
3	30	0.012481	0.18722
4	40	0.012498	0.18747
5	50	0.012515	0.18773
6	60	0.012531	0.18797
7	70	0.012548	0.18822
8	80	0.012565	0.18848
9	90	0.012582	0.18873
10	100	0.012615	0.18923
11	100	0.012649	0.18974
12	100	0.012632	0.18948

Grid impedance angle, ψk: 50°

Measurement	Plt	0.03144	
	P/Pn [%]	Pst	CΨk
1	10	0.013625	0.20438
2	20	0.013643	0.20465
3	30	0.013661	0.20492
4	40	0.01368	0.20520
5	50	0.013698	0.20547
6	60	0.013716	0.20574
7	70	0.013735	0.20603
8	80	0.013753	0.20630
9	90	0.013772	0.20658
10	100	0.013808	0.20712
11	100	0.013845	0.20768
12	100	0.013827	0.20741

Grid impedance angle, ψk: 70°			
Measurement	Plt	0.03273	
	P/Pn [%]	Pst	CΨk
1	10	0.014187	0.21281
2	20	0.014206	0.21309
3	30	0.014225	0.21338
4	40	0.014244	0.21366
5	50	0.014264	0.21396
6	60	0.014283	0.21425
7	70	0.014302	0.21453
8	80	0.014321	0.21482
9	90	0.01434	0.21510
10	100	0.014379	0.21569
11	100	0.014417	0.21626
12	100	0.014398	0.21597
Grid impedance angle, ψk: 85°			
Measurement	Plt	0.03240	
	P/Pn [%]	Pst	CΨk
1	10	0.014045	0.21068
2	20	0.014064	0.21096
3	30	0.014083	0.21125
4	40	0.014102	0.21153
5	50	0.014121	0.21182
6	60	0.014139	0.21209
7	70	0.014158	0.21237
8	80	0.014177	0.21266
9	90	0.014196	0.21294
10	100	0.014234	0.21351
11	100	0.014273	0.21410
12	100	0.014253	0.21380

5.7.2.3.5	Rapid voltage changes - Generation units with a rated current > 75 A				P
Voltage fluctuations caused by switching operations					
Grid frequency f [Hz]	50				
Grid voltage U_n [V]	230/400				
Rated current I_n [A]	360				
Remarks:	**K_{imax}**: is the ratio between the measured I_{max} and the I_{nom} (nominal current) of the device.				
Reactive set-point control, Q = 0					
Max. number of switching operations, N_{10}	1				
Max. number of switching operations, N_{120}	12				
Case of switching operation	Cut-in at 10% of rated power				
Grid impedance angle, ψ_k	30°	50°	70°	85°	
Flicker step factor, $k_f(\psi_k)$	0.0046	0.0045	0.0044	0.0044	
Voltage change factor, $k_u(\psi_k)$	0.1130	0.1130	0.1130	0.1130	
Reactive set-point control, Q = 0					
Max. number of switching operations, N_{10}	1				
Max. number of switching operations, N_{120}	12				
Case of switching operation	Cut-in at 100% of rated power				
Grid impedance angle	30°	50°	70°	85°	
Flicker step factor, $k_f(\psi_k)$	0.0103	0.0090	0.0093	0.0072	
Voltage change factor, $k_u(\psi_k)$	0.1130	0.1130	0.1130	0.1130	
Reactive set-point control, Q = 0					
Max. number of switching operations, N_{10}	1				
Max. number of switching operations, N_{120}	12				
Case of switching operation	Service disconnection				
Grid impedance angle	30°	50°	70°	85°	
Flicker step factor, $k_f(\psi_k)$	0.0060	0.0059	0.0058	0.0057	
Voltage change factor, $k_u(\psi_k)$	0.1130	0.1130	0.1130	0.1130	
Worst case over all switching operations, k_{imax}	0.0103				
Note(s): Each phase output current > 75A, the voltage fluctuations shall be comply with IEC 61400-21-1.					

5.7.2.4	TABLE: Verification procedure for DC injection			P
Test Conditions	Measurements			Limit
	Idc / In [%]			Idc/In
	L1	L2	L3	
30% - 40% Sn	0.006	0.006%	0.006%	Max(0.5%In,20mA)
60% - 70% Sn	0.05%	0.05%	0.05%	Max(0.5%In,20mA)
> 95% Sn	0.22%	0.22%	0.21%	Max(0.5%In,20mA)
Note(s):				

5.8.3	Table: Interface protection	P

All thresholds must be adjustable

Voltage values

Threshold	(27<)	tmin (27<)	(27<<)	tmin (27<<)	59>	tmax (59>)	59>>	tmax (59.S1)	59 10 min-mean
Range	0.2-1.0 U_n	0.1-100s	0.2-1.0 U_n	0.1-5s	1.0-1.2 U_n	0.1-100s	1.0-1.3 U_n	0.1-5s	1.0-1.15 U_n
Adjustable in Step	0.01 U_n	0.1s	0.01 U_n	0.05s	0.01 U_n	0.1s	0.01 U_n	0.05s	0.01 U_n

Frequency values

Threshold	81<	tmin (81<)	81<<	tmin (81<<)	81>	tmax (81>)	81>>	tmax (81>>)
Range	47.0-50.0Hz	0.1-100s	47.0-50.0Hz	0.1-5s	50.0-52.0Hz	0.1-100s	50.0-52.0Hz	0.1-5s
Steps	0.1 Hz	0.1s	0.1 Hz	0.05s	0.1 Hz	0.1s	0.1 Hz	0.05s

Note 1:	External SPI stays in operation conditions for 5s after disconnecting the mains voltage
Note 2:	The frequency protection shall function correctly in the input voltage range between 20% U_n and 120% Un and shall be inhibited for input voltages of less than 20% U_n. Under 20% U_n the frequency protection is inhibited. Disconnection may only happen based on undervoltage protection.

5.8.3.2	TABLE: Interface protection Voltage and frequency protections				P
Condition	Setting	Measurement			Limitation
		Trip value [V]			
		L123			
U<	20%Un	43.9			±1% of U_n
		43.9			
		43.9			
U<	45%Un	102.7			
		102.7			
		102.7			
U<	65%Un	102.3			
		102.3			
		102.3			
U<	100%Un	230.8			
		230.8			
		230.9			
Condition	Setting	Measurement			
		Trip value [V]			
		L1-N	L2-N	L3-N	
U<	20%Un	43.7	43.8	43.6	
		44.0	44.2	44.7	
		43.6	43.6	44.3	
U<	45%Un	102.7	102.3	102.7	
		102.7	102.3	102.7	
		102.7	102.3	102.7	
U<	65%Un	150.0	148.3	150.0	
		149.8	148.3	150.0	
		150.0	148.9	150.0	
U<	100%Un	230.4	229.7	230.2	
		230.6	229.7	230.9	
		230.8	229.1	230.8	
Condition	Setting	Measurement			

		Trip value [V]			
		L1-L2	L2-L3	L3-L1	
U<	20%Un	45.0	44.8	44.9	
		44.4	45.0	44.9	
		45.0	44.8	45.1	
U<	45%Un	102.7	102.7	102.7	
		102.7	102.7	102.7	
		101.9	102.7	102.7	
U<	65%Un	150.0	150.1	149.9	
		150.0	150.1	149.9	
		150.0	150.0	149.2	
U<	100%Un	230.9	230.9	230.9	
		230.9	230.5	230.8	
		230.9	230.9	230.7	
Notes: Ramp signal test					

Condition	Setting	Measurement	Limitation
		Trip value [V]	
		L123	
U<<	20%Un	44.5	±1% of U_n
		44.5	
		44.0	
U<<	45%Un	102.3	
		102.3	
		102.3	
U<<	65%Un	149.4	
		149.4	
		149.4	
U<<	100%Un	229.9	
		229.9	
		229.9	
Condition	Setting	Measurement	
		Trip value [V]	

		L1-N	L2-N	L3-N	
U<<	20%Un	45.0	44.7	45.0	
		44.9	45.0	45.0	
		45.0	44.5	45.0	
U<<	45%Un	102.3	102.7	103.9	
		102.2	102.5	102.9	
		103.9	102.7	103.9	
U<<	65%Un	149.3	148.7	150.0	
		149.3	148.8	149.8	
		149.5	148.8	149.8	
U<<	100%Un	230.3	229.6	230.9	
		230.3	228.9	230.9	
		230.3	229.3	230.9	
Condition	Setting	Measurement			
		Trip value [V]			
		L1-L2	L2-L3	L3-L1	
U<<	20%Un	44.9	44.2	44.9	
		45.0	45.0	44.2	
		45.0	45.0	45.0	
U<<	45%Un	101.9	102.5	102.6	
		103.9	103.9	103.9	
		103.7	103.8	103.7	
U<<	65%Un	149.9	150.0	150.0	
		150.0	150.0	149.5	
		148.9	150.0	150.0	
U<<	100%Un	230.8	230.9	230.7	
		230.7	230.5	230.9	
		230.7	230.9	230.8	
Notes: Ramp signal test					

Condition	Setting	Measurement			Limitation
		Trip value [V]			
		L123			
U>	100%Un	229.7			±1% of U_n
		229.7			
		229.7			
U>	106%Un	243.6			
		243.6			
		243.6			
U>	112%Un	257.5			
		257.5			
		257.5			
U>	120%Un	279.0			
		279.0			
		277.8			
Condition	Setting	Measurement			
		Trip value [V]			
		L1-N	L2-N	L3-N	
U>	100%Un	228.9	229.7	229.7	
		229.7	228.2	229.1	
		229.7	228.6	229.8	
U>	106%Un	243.6	243.2	243.6	
		243.6	243.6	243.6	
		243.4	243.3	243.6	
U>	112%Un	257.4	257.4	257.5	
		257.3	257.4	257.5	
		257.3	257.4	257.5	
U>	120%Un	277.0	277.0	276.0	
		276.0	275.5	275.6	
		276.0	277.0	275.9	
Condition	Setting	Measurement			
		Trip value [V]			
		L1-L2	L2-L3	L3-L1	

U>	100%Un	229.3	229.7	229.6	
		229.7	229.3	229.6	
		229.5	229.8	229.6	
U>	106%Un	243.6	243.6	243.6	
		243.6	243.6	243.6	
		243.6	243.6	243.6	
U>	112%Un	257.4	257.2	257.3	
		257.4	257.0	257.4	
		257.4	257.5	257.5	
U>	120%Un	275.0	276.0	276.0	
		275.7	275.8	276.0	
		275.9	275.9	275.7	
Notes: Ramp signal test					

Condition	Setting	Measurement			Limitation
		Trip value [V]			
		L123			
U>>	100%Un	231.1			±1% of U_n
		231.1			
		231.1			
U>>	109%Un	252.9			
		252.4			
		252.4			
U>>	118%Un	272.4			
		272.4			
		272.5			
U>>	130%Un	300.0			
		300.0			
		300.0			
Condition	Setting	Measurement			
		Trip value [V]			
		L1-N	L2-N	L3-N	
U>>	100%Un	229.6	229.7	229.7	

		229.7	229.7	229.8	
		229.6	229.8	229.8	
U>>	109%Un	250.3	249.8	250.5	
		250.5	250.5	250.6	
		250.5	250.4	250.5	
U>>	118%Un	272.4	272.4	272.5	
		272.4	272.4	271.3	
		272.4	272.4	271.3	
U>>	130%Un	298.4	298.5	299.7	
		298.8	298.5	299.8	
		299.6	298.5	298.4	
Condition	Setting	Measurement			
		Trip value [V]			
		L1-L2	L2-L3	L3-L1	
U>>	100%Un	229.5	229.8	229.8	
		229.5	229.5	229.6	
		229.7	229.7	229.5	
U>>	109%Un	250.4	250.5	250.6	
		250.5	250.6	250.5	
		250.2	250.2	250.6	
U>>	118%Un	271.3	271.2	271.3	
		271.3	271.3	271.3	
		271.2	271.3	271.3	
U>>	130%Un	298.3	299.0	299.0	
		299.3	298.4	299.0	
		298.9	299.5	299.0	
Notes: Ramp signal test					

Condition	Setting [ms]	Measurement			Limitation
		Trip time			
		L123			
U<	100	119			100-200
		111			
		119			
U<	30000	30010			30000-30100
		30010			
		30040			
U<	60000	60010			60000-60100
		60020			
		60040			
U<	100000	100040			100000-100100
		100020			
		100010			
Condition	Setting [ms]	Measurement			Limitation
		Trip time			
		L1-N	L2-N	L3-N	
U<	100	163	160	147	100-200
		151	146	122	
		172	174	150	
U<	30000	30070	30020	30050	30000-30100
		30050	30010	30040	
		30030	30010	30040	
U<	60000	60020	60020	60030	60000-60100
		60010	60010	60040	
		60040	60010	60040	
U<	100000	100020	100040	100060	100000-100100
		100040	100070	100040	
		100050	100070	100060	
Condition	Setting [ms]	Measurement			Limitation
		Trip time			
		L1-L2	L2-L3	L3-L1	
U<	100	115	118	102	100-200
		109	127	127	
		124	117	108	

U<	30000	30030	30090	30050	30000-30100
		30010	30030	30090	
		30030	30090	30010	
U<	60000	60030	60010	60010	60000-60100
		60010	60010	60030	
		60020	60030	60020	
U<	100000	100010	100020	100070	100000-100100
		100010	100040	100050	
		100020	100010	100010	
Note(s): Jump signal test					

Condition	Setting [ms]	Measurement			Limitation
		Trip time			
		L123			
U<<	100	126			100-200
		126			
		142			
U<<	1500	1510			1500-1600
		1510			
		1540			
U<<	3000	3090			3000-3100
		3090			
		3090			
U<<	5000	5050			5000-5100
		5020			
		5030			
Condition	Setting [ms]	Measurement			Limitation
		Trip time			
		L1-N	L2-N	L3-N	
U<<	100	110	140	107	100-200
		117	171	106	
		111	140	100	
U<<	1500	1510	1560	1530	1500-1600
		1510	1560	1520	
		1520	1530	1510	

U<<	3000	3040	3010	3070	3000-3100
		3010	3010	3030	
		3010	3010	3060	
U<<	5000	5050	5080	5070	5000-5100
		5070	5060	5090	
		5060	5060	5080	
Condition	Setting [ms]	Measurement			Limitation
		Trip time			
		L1-L2	L2-L3	L3-L1	
U<<	100	121	132	122	100-200
		131	123	118	
		138	118	110	
U<<	1500	1590	1530	1520	1500-1600
		1570	1540	1540	
		1510	1550	1550	
U<<	3000	3040	3010	3060	3000-3100
		3080	3030	3010	
		3010	3050	3040	
U<<	5000	5060	5080	5090	5000-5100
		5060	5080	5080	
		5060	5070	5060	
Note(s): Jump signal test					

Condition	Setting [ms]	Measurement	Limitation
		Trip time	
		L123	
U>	100	100.05	100-200
		100.06	
		100.07	
U>	30000	30010	30000-30100
		30020	
		30010	
U>	60000	60030	60000-60100
		60040	
		60060	

U>	100000	100050			100000-100100
		100060			
		100070			
Condition	Setting [ms]	Measurement			Limitation
		Trip time			
		L1-N	L2-N	L3-N	
U>	100	167	192	143	100-200
		142	193	152	
		173	185	160	
U>	30000	30030	30030	30040	30000-30100
		30030	30010	30010	
		30050	30040	30010	
U>	60000	60050	60040	60050	60000-60100
		60050	60040	60010	
		60010	60040	60070	
U>	100000	100040	100080	100040	100000-100100
		100070	100010	100050	
		100030	100060	100050	
Condition	Setting [ms]	Measurement			Limitation
		Trip time			
		L1-L2	L2-L3	L3-L1	
U>	100	161	133	180	100-200
		145	135	167	
		145	157	137	
U>	30000	30020	30010	30010	30000-30100
		30010	30010	30030	
		30040	30020	30030	
U>	60000	60060	60010	60060	60000-60100
		60030	60010	60050	
		60020	60070	60010	
U>	100000	100060	100090	100040	100000-100100
		100040	100060	100020	
		100030	100080	100040	
Note(s): Jump signal test					

Condition	Setting [ms]	Measurement			Limitation
		Trip time			
		L123			
U>>	100	138			100-200
		188			
		151			
U>>	1500	1510			1500-1600
		1510			
		1510			
U>>	3000	3010			3000-3100
		3010			
		3050			
U>>	5000	5010			5000-5100
		5090			
		5060			
Condition	Setting [ms]	Measurement			Limitation
		Trip time			
		L1-N	L2-N	L3-N	
U>>	100	128	159	150	100-200
		140	151	134	
		140	166	143	
U>>	1500	1550	1510	1560	1500-1600
		1540	1540	1530	
		1530	1570	1510	
U>>	3000	3090	3080	3070	3000-3100
		3070	3080	3090	
		3060	3090	3070	
U>>	5000	5020	5030	5020	5000-5100
		5060	5060	5080	
		5080	5030	5090	
Condition	Setting [ms]	Measurement			Limitation
		Trip time			
		L1-L2	L2-L3	L3-L1	
U>>	100	155	146	132	100-200
		149	150	142	
		142	160	137	

U>>	1500	1550	1540	1510	1500-1600
		1540	1560	1510	
		1570	1580	1520	
U>>	3000	3060	3070	3070	3000-3100
		3060	3070	3080	
		3080	3080	3080	
U>>	5000	5050	5090	5040	5000-5100
		5040	5040	5030	
		5050	5060	5040	
Note(s): Jump signal test					

Condition	Setting	Measurement	Limitation
		Trip value [Hz]	
F>	50Hz	50.03	±0.1% of f_n
		50.02	
		50.02	
F>	50.5Hz	50.52	
		50.52	
		50.52	
F>	51.5Hz	51.53	
		51.53	
		51.52	
F>	52Hz	52.0	
		52.0	
		52.0	

Condition	Setting	Measurement	Limitation
		Trip value [Hz]	
F>>	50Hz	50.02	±0.1% of f_n
		50.02	
		50.02	
F>>	50.5Hz	50.52	
		50.53	
		50.53	
F>>	51.5Hz	51.50	
		51.50	
		51.53	
F>>	52Hz	52.0	
		52.0	
		52.0	

Condition	Setting	Measurement	Limitation
		Trip value [Hz]	
F<	47Hz	47.0	±0.1% of f_n
		47.0	
		47.0	

F<	48Hz	47.97	
		47.97	
		47.97	
F<	49Hz	48.97	
		48.97	
		48.97	
F<	50Hz	49.97	
		49.97	
		49.97	

Condition	Setting	Measurement	Limitation
		Trip value [Hz]	
F<<	47Hz	46.97	±0.1% of f_n
		46.97	
		46.98	
F<<	48Hz	47.97	
		47.97	
		47.97	
F<<	49Hz	48.97	
		48.97	
		48.97	
F<<	50Hz	49.97	
		49.97	
		49.97	

Condition	Setting [ms]	Measurement	Limitation
		Trip time	
F>	100	194	100-200
		178	
		193	
F>	30000	30060	30000-30100
		30040	
		30070	
F>	60000	60010	60000-60100
		60010	

		60020	
F>	100000	100040	100000-100100
		100050	
		100030	
Note(s):			

Condition	Setting [ms]	Measurement	Limitation
		Trip time	
F>>	100	165	100-200
		191	
		171	
F>>	1500	1560	1500-1600
		1560	
		1540	
F>>	3000	3080	3000-3100
		3040	
		3040	
F>>	5000	5040	5000-5100
		5060	
		5090	
Note(s):			

Condition	Setting [ms]	Measurement	Limitation
		Trip time	
F<	100	179	100-200
		159	
		198	
F<	30000	30010	30000-30100
		30070	
		30010	
F<	60000	60040	60000-60100
		60040	
		60020	
F<	100000	100010	100000-100100
		100060	

		100030	
Note(s):			

Condition	Setting [ms]	Measurement	Limitation
		Trip time	
F<<	100	196	100-200
		183	
		163	
F<<	1500	1520	1500-1600
		1540	
		1550	
F<<	3000	3010	3000-3100
		3010	
		3040	
F<<	5000	5010	5000-5100
		5090	
		5080	
Note(s):			

5.8.3.2.4	TABLE: Reset time and reset ratio							P	
Condition	Setting U/Un [ms]	Measurement						Limitation	
		L1-N		L2-N		L3-N			
		Reset time	Result	Reset time	Result	Reset time	Result	Reset time	Result
U> Un-1.13Un(2940ms)-1.08Un(3200ms)-Un	1.1Un/3000	≤50ms	No trip	≤50ms	No trip	≤50ms	No trip	≤50ms	No trip
		≤50ms	No trip	≤50ms	No trip	≤50ms	No trip		
		≤50ms	No trip	≤50ms	No trip	≤50ms	No trip		
U>> Un-1.23Un(40ms)-1.18Un(300ms)-Un	1.2Un/100	≤50ms	No trip	≤50ms	No trip	≤50ms	No trip		
		≤50ms	No trip	≤50ms	No trip	≤50ms	No trip		
		≤50ms	No trip	≤50ms	No trip	≤50ms	No trip		
U< Un-0.87Un(2940ms)-0.92Un(3200ms)-Un	0.9Un/3000	≤50ms	No trip	≤50ms	No trip	≤50ms	No trip		
		≤50ms	No trip	≤50ms	No trip	≤50ms	No trip		
		≤50ms	No trip	≤50ms	No trip	≤50ms	No trip		

U<< Un- 0.77Un(40ms)- 0.82Un(300ms)- Un	0.8Un/ 100	≤50ms	No trip	≤50ms	No trip	≤50ms	No trip		
		≤50ms	No trip	≤50ms	No trip	≤50ms	No trip		
		≤50ms	No trip	≤50ms	No trip	≤50ms	No trip		

Condition	Setting HZ/ [ms]	Measurement		Limitation	
		Reset time	Result	Reset time	Result
F< 50HZ- 49.2HZ(2940ms)- 49.7HZ(3200ms)- 50HZ	49.5/ 3000	≤50ms	No trip	≤50ms	No trip
		≤50ms	No trip		
		≤50ms	No trip		
F<< 50HZ- 48.2HZ(40MS)- 48.7HZ(300ms)- 50HZ	48.5/ 100	≤50ms	No trip		
		≤50ms	No trip		
		≤50ms	No trip		
F> 50HZ- 50.8HZ(2940ms)- 50.3HZ(3200ms)- 50HZ	50.5/ 3000	≤50ms	No trip		
		≤50ms	No trip		
		≤50ms	No trip		
F>> 50HZ- 51.8HZ(40ms)- 51.3HZ(300ms)- 50HZ	51.5 100	≤50ms	No trip		
		≤50ms	No trip		
		≤50ms	No trip		

5.8.3.3	TABLE: Overvoltage 10 min mean protection		P
Condition	Setting	Measurement	Limitation
		Trip value [V]	
U>	110%Un	253.8	±1% of U_n
Condition	Setting	Measurement	Limitation
		Trip time	
a) Operation under 100%Un for 10 minutes, then jumped from 100%Un to 112%Un.			
U>	600	517	450-550s
b) Operation under 100%Un for 10 minutes, then jumped from 100%Un to 108%Un.			
U>	600	No disconnection	No disconnect
c) Operation under 106%Un for 10 minutes, then jumped from 106%Un to 114%Un.			
U>	600	318	225-375s (≤ ½ a) ± 75s)
Note(s):			

5.8.3.4	TABLE: ROCOF protection Accuracy of the ROCOF setting values and operate time	P

Condition	ROCOF Setting (Hz/s)	Measurement					Limitation
		f_{Start}	f_{End}	Duration (s)	ROCOF test (Hz/s)	Result	
RVAL POS 1	2.0	50	51.9	1.0	+1.9	No trip	No trip
RVAL NEG 1	2.0	50	48.1	1.0	-1.9	No trip	
RVAL POS 1	2.5	50	52.4	1.0	+2.4	No trip	
RVAL NEG 1	2.5	50	47.6	1.0	-2.4	No trip	
RVAL POS 1	3.5	50	53.4	1.0	+3.4	No trip	
RVAL NEG 1	3.5	50	46.6	1.0	-3.4	No trip	

Condition	ROCOF Setting (Hz/s)	Measurement					Limitation
		f_{Start}	f_{End}	Duration (s)	ROCOF test (Hz/s)	Trip time (ms)	
RVAL POS 1	2.0	50	52.1	1.0	+2.1	92	≤ 100 ms [1)]
RVAL NEG 1	2.0	50	47.9	1.0	-2.1	99	
RVAL POS 1	2.5	50	52.6	1.0	+2.6	94	
RVAL NEG 1	2.5	50	47.4	1.0	-2.6	99	
RVAL POS 1	3.5	50	53.6	1.0	+3.6	93	
RVAL NEG 1	3.5	50	46.4	1.0	-3.6	92	

Note(s):

[1)] The ROCOF immunity is defined with a sliding measurement window of 500 ms.

The over/under frequency protection (81 <, 81 <<, 81 >, 81 >>) should be disabled under ROCOF test.

5.8.6	TABLE: Islanding detection	P

Power 100%

Input : 875 Vdc, P_{EUT} : 500 kW

Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R: -10% Q_C: +10%	L1: 178.750	L1: 167.083	L1: 147.000	0.940	244	2000
	L2: 175.542	L2: 166.667	L2: 146.250	0.951		
	L3: 170.042	L3: 166.667	L3: 146.625	0.939		
P_R: -10% Q_C: +5%	L1: 178.750	L1: 166.667	L1: 155.167	0.941	316	2000
	L2: 175.542	L2: 166.250	L2: 154.375	0.951		
	L3: 170.042	L3: 166.667	L3: 154.771	0.937		
P_R: -10% Q_C: 0%	L1: 178.750	L1: 166.250	L1: 163.333	0.968	556	2000
	L2: 175.542	L2: 166.667	L2: 162.500	0.970		
	L3: 170.042	L3: 166.667	L3: 162.917	0.970		
P_R: -10% Q_C: -5%	L1: 178.750	L1: 166.250	L1: 171.500	0.991	335	2000
	L2: 175.542	L2: 166.667	L2: 170.625	0.999		
	L3: 170.042	L3: 166.250	L3: 171.083	0.992		
P_R: -10% Q_C: -10%	L1: 178.750	L1: 166.250	L1: 179.667	0.990	227	2000
	L2: 175.542	L2: 166.667	L2: 178.750	0.997		
	L3: 170.042	L3: 166.667	L3: 179.208	0.991		
P_R: -5% Q_C: +10%	L1: 170.625	L1: 166.667	L1: 147.000	0.992	270	2000
	L2: 167.542	L2: 166.250	L2: 146.250	0.998		
	L3: 162.333	L3: 166.667	L3: 146.625	0.991		
P_R: -5% Q_C: -10%	L1: 170.625	L1: 166.667	L1: 179.667	0.990	275	2000
	L2: 167.583	L2: 166.250	L2: 178.750	0.997		
	L3: 162.333	L3: 167.083	L3: 179.208	0.991		
P_R: 0% Q_C: +10%	L1: 162.500	L1: 166.667	L1: 147.000	0.996	337	2000
	L2: 159.583	L2: 166.667	L2: 146.250	0.998		
	L3: 154.583	L3: 166.667	L3: 146.625	0.999		
P_R: -5% Q_C: +5%	L1: 172.500	L1: 166.667	L1: 165.833	0.950	578	2000
	L2: 170.000	L2: 166.250	L2: 165.833	0.951		
	L3: 165.417	L3: 166.667	L3: 166.250	0.949		

Power 100%						
Input : 875 Vdc, P_{EUT} : 500 kW						
Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R: -5% Q_C: 0%	L1: 172.500	L1: 166.667	L1: 173.750	0.972	930	2000
	L2: 170.417	L2: 166.667	L2: 174.167	0.974		
	L3: 165.417	L3: 167.083	L3: 174.583	0.974		
P_R: -5% Q_C: -5%	L1: 172.917	L1: 166.250	L1: 181.667	0.993	703	2000
	L2: 170.417	L2: 166.667	L2: 182.500	0.999		
	L3: 165.417	L3: 167.083	L3: 182.917	0.994		
P_R: 0% Q_C: +5%	L1: 163.750	L1: 166.667	L1: 165.417	0.999	903	2000
	L2: 161.250	L2: 166.250	L2: 165.833	1.001		
	L3: 156.250	L3: 167.500	L3: 166.250	1.004		
P_R: 0% Q_C: 0%	L1: 162.500	L1: 175.083	L1: 163.333	1.002	935	2000
	L2: 159.583	L2: 167.083	L2: 162.500	1.004		
	L3: 154.583	L3: 167.083	L3: 162.917	1.002		
P_R: 0% Q_C: -5%	L1: 164.583	L1: 166.667	L1: 182.083	1.045	925	2000
	L2: 161.667	L2: 166.667	L2: 182.500	1.049		
	L3: 156.667	L3: 167.083	L3: 183.333	1.050		
P_R: +5% Q_C: +5%	L1: 155.833	L1: 167.083	L1: 165.417	1.050	566	2000
	L2: 153.750	L2: 167.083	L2: 165.833	1.051		
	L3: 148.333	L3: 166.667	L3: 166.667	1.053		
P_R: +5% Q_C: 0%	L1: 156.250	L1: 166.250	L1: 173.750	1.073	908	2000
	L2: 153.333	L2: 166.667	L2: 173.750	1.078		
	L3: 147.917	L3: 166.667	L3: 174.583	1.080		
P_R: +5% Q_C: -5%	L1: 157.500	L1: 167.500	L1: 175.417	1.071	572	2000
	L2: 156.250	L2: 170.833	L2: 176.250	1.076		
	L3: 158.333	L3: 168.333	L3: 190.417	1.064		
P_R: 0% Q_C: -10%	L1: 162.500	L1: 166.250	L1: 179.667	1.040	422	2000
	L2: 159.583	L2: 166.667	L2: 178.750	1.045		
	L3: 154.583	L3: 166.667	L3: 179.208	1.048		

Power 100%						
Input : 875 Vdc, P_{EUT} : 500 kW						
Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R: +5% Q_C: +10%	L1: 154.375	L1: 166.667	L1: 147.000	1.047	266	2000
	L2: 151.625	L2: 166.667	L2: 146.250	1.049		
	L3: 146.917	L3: 167.083	L3: 146.625	1.050		
P_R: +5% Q_C: -10%	L1: 154.375	L1: 166.250	L1: 179.667	1.069	267	2000
	L2: 151.625	L2: 166.667	L2: 178.750	1.074		
	L3: 146.917	L3: 166.667	L3: 179.208	1.060		
P_R: +10% Q_C: +10%	L1: 146.250	L1: 166.667	L1: 147.000	1.040	188	2000
	L2: 143.625	L2: 166.667	L2: 146.250	1.041		
	L3: 139.125	L3: 167.083	L3: 146.625	1.042		
P_R: +10% Q_C: +5%	L1: 146.292	L1: 166.250	L1: 155.167	1.043	276	2000
	L2: 143.625	L2: 166.667	L2: 154.375	1.045		
	L3: 139.125	L3: 166.667	L3: 154.792	1.047		
P_R: +10% Q_C: 0%	L1: 146.333	L1: 166.667	L1: 163.333	1.065	448	2000
	L2: 143.625	L2: 166.667	L2: 162.500	1.073		
	L3: 139.125	L3: 167.500	L3: 162.917	1.075		
P_R: +10% Q_C: -5%	L1: 146.375	L1: 166.667	L1: 171.500	1.066	275	2000
	L2: 143.625	L2: 166.667	L2: 170.625	1.070		
	L3: 139.125	L3: 167.083	L3: 171.042	1.062		
P_R: +10% Q_C: -10%	L1: 146.333	L1: 167.083	L1: 179.667	1.062	202	2000
	L2: 143.625	L2: 167.083	L2: 178.792	1.065		
	L3: 179.208	L3: 139.125	L3: 166.667	1.060		

Power 66%						
Input : 821 Vdc, P_{EUT} : 330 kW						
Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R: 0% Q_C: -5%	L1: 105.417	L1: 110.000	L1: 120.833	1.044	244	2000
	L2: 105.000	L2: 109.583	L2: 120.833	1.046		
	L3: 104.583	L3: 109.583	L3: 121.250	1.048		

Power 66%						
Input : 821 Vdc, P_{EUT} : 330 kW						
Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R: 0% Q_C: -4%	L1: 105.000	L1: 110.000	L1: 120.000	1.044	267	2000
	L2: 105.417	L2: 109.583	L2: 120.417	1.040		
	L3: 104.583	L3: 109.583	L3: 120.417	1.044		
P_R: 0% Q_C: -3%	L1: 105.417	L1: 110.000	L1: 119.167	1.037	270	2000
	L2: 105.000	L2: 109.583	L2: 119.167	1.039		
	L3: 104.583	L3: 109.583	L3: 119.167	1.039		
P_R: 0% Q_C: -2%	L1: 105.417	L1: 110.000	L1: 117.500	1.030	336	2000
	L2: 105.417	L2: 110.417	L2: 117.917	1.033		
	L3: 104.583	L3: 110.000	L3: 117.917	1.031		
P_R: 0% Q_C: -1%	L1: 105.417	L1: 110.000	L1: 116.667	1.026	422	2000
	L2: 105.000	L2: 110.000	L2: 117.083	1.032		
	L3: 104.583	L3: 110.000	L3: 117.083	1.028		
P_R: 0% Q_C: 0%	L1: 105.833	L1: 110.000	L1: 111.667	1.000	908	2000
	L2: 105.417	L2: 110.000	L2: 111.250	1.002		
	L3: 105.000	L3: 110.000	L3: 111.667	1.000		
P_R: 0% Q_C: +1%	L1: 105.417	L1: 110.000	L1: 114.167	1.015	703	2000
	L2: 105.417	L2: 110.417	L2: 114.583	1.019		
	L3: 104.583	L3: 110.000	L3: 114.583	1.021		
P_R: 0% Q_C: +2%	L1: 105.000	L1: 110.000	L1: 113.333	1.015	578	2000
	L2: 105.417	L2: 109.583	L2: 113.750	1.011		
	L3: 104.583	L3: 109.583	L3: 113.750	1.015		
P_R: 0% Q_C: +3%	L1: 105.000	L1: 110.000	L1: 112.500	1.011	572	2000
	L2: 105.000	L2: 109.583	L2: 112.917	1.011		
	L3: 104.583	L3: 109.583	L3: 112.500	1.006		
P_R: 0% Q_C: +4%	L1: 105.417	L1: 110.000	L1: 110.417	0.998	566	2000
	L2: 105.000	L2: 110.417	L2: 107.917	0.992		
	L3: 104.583	L3: 110.000	L3: 110.833	1.000		

Power 66%						
Input : 821 Vdc, P_{EUT} : 330 kW						
Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R: 0% Q_C: +5%	L1: 105.417	L1: 110.000	L1: 109.167	0.992	556	2000
	L2: 105.000	L2: 109.583	L2: 109.167	0.994		
	L3: 104.583	L3: 110.000	L3: 110.000	0.996		

Power 33%						
Input : 757 Vdc, P_{EUT} : 165 kW						
Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R: 0% Q_C: -5%	L1: 53.333	L1: 55.000	L1: 63.750	1.061	188	2000
	L2: 52.500	L2: 55.417	L2: 65.000	1.091		
	L3: 52.917	L3: 55.000	L3: 65.000	1.079		
P_R: 0% Q_C: -4%	L1: 53.333	L1: 55.000	L1: 62.917	1.054	202	2000
	L2: 52.500	L2: 55.000	L2: 64.167	1.080		
	L3: 52.917	L3: 55.000	L3: 64.167	1.072		
P_R: 0% Q_C: -3%	L1: 52.917	L1: 55.000	L1: 62.917	1.062	227	2000
	L2: 52.500	L2: 55.000	L2: 63.750	1.077		
	L3: 52.917	L3: 55.000	L3: 63.750	1.069		
P_R: 0% Q_C: -2%	L1: 53.333	L1: 55.000	L1: 62.917	1.054	275	2000
	L2: 52.500	L2: 55.000	L2: 62.917	1.070		
	L3: 52.917	L3: 55.000	L3: 63.333	1.065		
P_R: 0% Q_C: -1%	L1: 53.333	L1: 55.000	L1: 62.083	1.047	316	2000
	L2: 52.500	L2: 55.000	L2: 62.500	1.066		
	L3: 52.917	L3: 55.000	L3: 62.917	1.062		
P_R: 0% Q_C: 0%	L1: 52.917	L1: 55.000	L1: 55.833	1.000	930	2000
	L2: 52.500	L2: 55.000	L2: 55.000	1.000		
	L3: 52.917	L3: 55.000	L3: 55.833	1.000		
P_R: 0% Q_C: +1%	L1: 53.333	L1: 55.000	L1: 61.250	1.047	448	2000
	L2: 52.500	L2: 55.000	L2: 61.667	1.059		
	L3: 52.917	L3: 55.000	L3: 61.667	1.051		

Power 33%						
Input : 757 Vdc, P_{EUT} : 165 kW						
Conditions	P_R [kW]	Q_L [kVar]	Q_C [kVar]	Q_f	Trip time [ms]	Limitation [ms]
P_R: 0% Q_C: +2%	L1: 52.917	L1: 55.000	L1: 59.583	1.033	337	2000
	L2: 52.500	L2: 55.000	L2: 60.833	1.052		
	L3: 52.917	L3: 55.000	L3: 60.833	1.036		
P_R: 0% Q_C: +3%	L1: 53.333	L1: 55.000	L1: 59.167	1.022	276	2000
	L2: 52.500	L2: 55.000	L2: 60.417	1.048		
	L3: 52.917	L3: 55.000	L3: 60.417	1.040		
P_R: 0% Q_C: +4%	L1: 53.333	L1: 55.000	L1: 58.750	1.018	275	2000
	L2: 52.500	L2: 55.000	L2: 60.000	1.044		
	L3: 52.917	L3: 55.000	L3: 60.417	1.040		
P_R: 0% Q_C: +5%	L1: 52.917	L1: 55.000	L1: 57.083	1.011	266	2000
	L2: 52.500	L2: 55.000	L2: 56.667	1.015		
	L3: 52.500	L3: 55.000	L3: 57.500	1.022		
Note(s):						

5.9	TABLE: Connection and starting	P

Table 32 — Default parameter automatic reconnection after tripping according to EN 50549-1:2019 and EN 50549-2:2019

Parameter	Range	Default setting
Lower frequency	47,0Hz – 50,0 Hz	49,5 Hz
Upper frequency	50,0 Hz – 52,0 Hz	50,2 Hz
Lower voltage	50 %U_n – 100 %U_n	85 % U_n[a] / 90 % U_c[b]
Upper voltage	100 % – 120 % U_n	110 %U_n[a] / 110 %U_c[b]
Observation time	10 s – 600 s	60 s
Active power increase gradient	6 % – 3000 %/min	10 %/min
[a] In case of EN 50549-1:2019 [b] In case of EN 50549-2:2019		

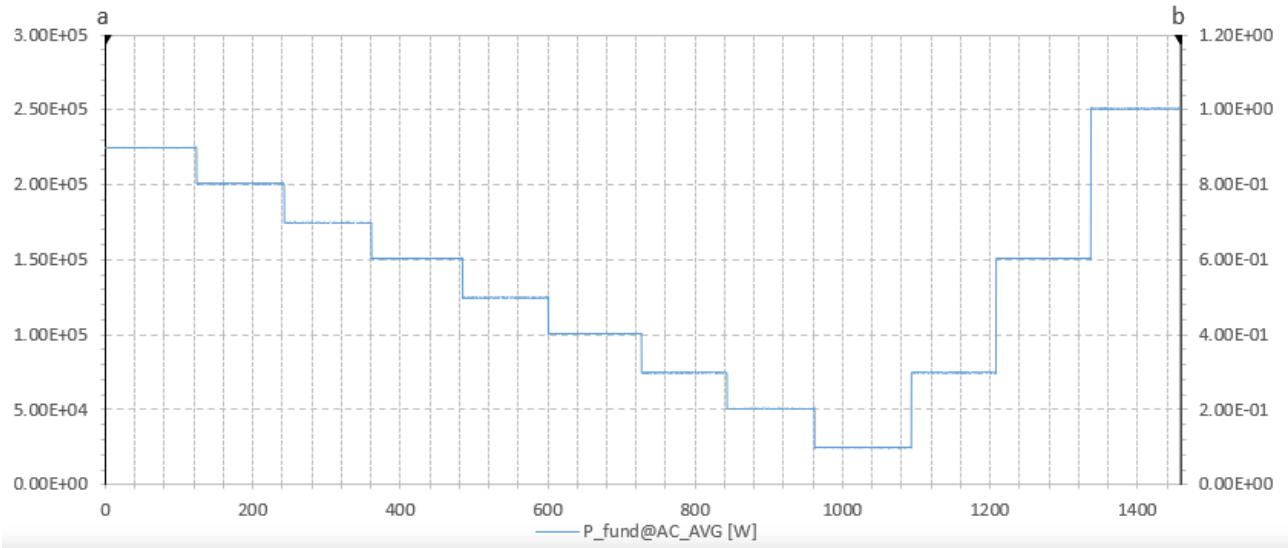
When the interface protection has been triggered, it shall be examined whether the system can only be connected within the tolerance ranges $0{,}85\ U_n \le U \le 1{,}10\ U_n$ or $0{,}90\ U_c \le U \le 1{,}10\ U_c$ and $47{,}5\ \text{Hz} \le f \le 50{,}05\ \text{Hz}$ and after the voltage and frequency remain within the tolerance ranges 60 s.

Table 33 — Default parameter starting to generate electrical power according to EN 50549-1:2019 and EN 50549-2:2019

Parameter	Range	Default setting
Lower frequency	47,0Hz – 50,0 Hz	49,5 Hz
Upper frequency	50,0 Hz – 52,0 Hz	50,1 Hz
Lower voltage	50 %U_n – 100 %U_n	85 % U_n [a] / 90 % U_c[b]
Upper voltage	100 % – 120 % U_n	110 %U_n[a] / 110 %U_c[b]
Observation time	10 s – 600 s	60 s
Active power increase gradient	6 % – 3000 %/min	disabled
[a] In case of EN 50549-1:2019 [b] In case of EN 50549-2:2019		

Condition	Measurement		Limitation	
	Delay time [s]	Power Gradient [per mimute]	Delay time	Power Gradient
Connection:				
U>	115.0	--	⩾60s	--
U<	120.8	--		
f>	112.4	--		
f<	116.2	--		
Reonnection:				
U>	117.8	8.43	⩾60s	≤10%Pn/minutes
U<	112.2	7.45		
f>	116.6	8.91		
f<	119.4	8.05		
Note(s):				

5.10	TABLE: Active power reduction on set point					P
Active power step [p.u. of Pn]	Requested set point value	Actual value		accuracy Actual value - Set point		Limit
P/Pn	W	W	P/Pn [p.u.]	W	P/Pn [p.u.]	P/Pn [p.u.]
90%	225000	224709	89.88%	225000	0.12%	±5%Pn
80%	200000	200714	80.29%	200000	0.29%	
70%	175000	174730	69.89%	175000	0.11%	
60%	150000	150721	60.29%	150000	0.29%	
50%	125000	124680	49.87%	125000	0.13%	
40%	100000	100635	40.25%	100000	0.25%	
30%	75000	74602	29.84%	75000	0.16%	
20%	50000	50744	20.30%	50000	0.30%	
10%	25000	24630	9.85%	25000	0.15%	
30%	75000	74608	29.84%	75000	0.16%	+5%Pn
60%	150000	150742	60.30%	150000	0.30%	
100%	250000	250735	100.29%	250000	0.29%	



Test Conditions	Measurements	Limitation
P/Pn	Gradient	Gradient
90% to 10%	0.45%Pn/s	0.33-0.66%Pn/s
Note(s):		

5.11	TABLE: Remote information exchange	P
Test Conditions	Measurements [s]	Δ Limit
Command signal from connection to disconnection	0.602	⩽ 1 s
Note(s):		

5.12	TABLE: Requirements regarding single fault tolerance of interface protection system and interface switch	P

No.	component No.	fault	test voltage (Vd.c.)	test time	fuse No.	Input current (A)	Result
Liquid Cooling System							
1.	Liquid cooling control system power supply	Wrong connected	832	10min	-	-	Abnormal power supply of liquid cooling unit, liquid cooling unit stops running.
2.	Liquid cooling unit water supply pump communication	O-C	832	10min	-	-	Liquid-cooled unit pump, compressor stop running, reported circulating water pump frequency converter communication failure
3.	Liquid-cooled unit outlet water pressure sensor	O-C	832	10min	-	-	Liquid-cooled unit stopped and reported the outlet water pressure sensor. The equipment alarmed
4.	Liquid-cooled unit outlet water temperature sensor	O-C	832	10min	-	-	Liquid-cooled unit pump can run normally, the compressor works, reported the water temperature sensor failure, equipment alarms
5.	Liquid cooling unit 485 communication	O-C	832	10min	-	-	Liquid-cooled unit can’t start.
6.	Evaporative fan	O-C	832	10min	-	-	Liquid-cooled unit can’t start.
Fire Protection							
7.	Fire protection system	O-C	832	10min	-	-	The system shut down immediately. One of the detectors has a wiring fault and the concentrator K6/COM loop is open.
8.	Fire system primary alarm (smoke alarm)	O-C	832	10min	-	-	The system shuts down immediately. The audible and visual alarms are activated, and the EMS interface displays a VOC alarm.
9.	Fire system secondary alarm (smoke sensor alarm, temperature sensor alarm)	O-C	832	10min	-	-	The system shuts down immediately. Audible and visual alarm activated, aerosol released.
10.	Combustible gas concentration over limit	O-C	832	10min			System shutdown immediately. High hydrogen concentration, exhaust grille opens, exhaust fan activates, H2 alarm displayed.

No.	component No.	fault	test voltage (Vd.c.)	test time	fuse No.	Input current (A)	Result
11.	Fire fighting gas release	O-C	832	10min			System shuts down immediately. Exhaust grille opens, exhaust fan activates, system shuts down immediately.
12.	Fire-fighting fan communication	O-C	832	10min			System alarmed.The EMS interface can detect the status of the grille and the fan.
Main circuits and Aux power							
13.	Auxiliary power supply branch circuit disconnected	O-C	832	10min	-	-	The system cannot be operated. Auxiliary power switch F1 alarm.
14.	Auxiliary circuit fan power supply failure	O-C	832	10min	-	-	The system cannot be operated. Dehumidifier switch alarm
15.	System emergency	O-C	832	10min	-	-	System cannot be operated. Emergency stop switch fault condition.
16.	System hatch open	O-C	832	10min	-	-	System cannot be operated. Door switch fault status.
17.	Main circuit breaker failure	Open	832	10min	-	-	System cannot be operated. Main circuit breaker disconnected.
18.	PCS shutdown	shutdown	832	10min	-	-	System fails to operate. CPLD fault and emergency stop fault
19.	PCS and EMS communication failure	O-C	832	10min	-	-	The EMS interface displays a communication connection failure.
20.	Phase sequence error	error	832	10min	-	-	System fails to operate. CPLD fault and emergency stop fault
21.	Battery pack DC switching power supply failure	O-C	832	10min	-	-	System cannot operate. DCDC 24v power supply status fault.

Note(s):

1. In Fault column, s-c=short circuit, o-c=open circuit. The unit passed electric strength test after single fault test above.

Revision History:

Date YYYY-MM-DD	Contents of modification (latest on top)	Prepared by	Approved by
2023-02-02	Originated and released into QM system	5.1.2e	5.1.2e

PHOTO DOCUMENTATION

CN25EQ5Z 001 attachment 2

for

C&I Energy storage system

CESS932-500-01D, CESS699-375-01D,
CESS466-250-01D

Suzhou RCT Power Energy Technology Co., Ltd

This documentation consists of 9 pages (excluding this cover page)



Photo 1-Overall view of CESS932-500-01D



Photo 2-Back view of CESS932-500-01D



Photo 3-Side view of CESS932-500-01D



Photo 4-Internal view 1(CESS932-500-01D)



Photo 5-Internal view 2(CESS932-500-01D)



Photo 6-Internal view 1 front side(CESS699-375-01D)



Photo 7-Internal view 2 back side(CESS699-375-01D)



Photo 8-Internal view 1 front side (CESS466-250-01D)



Photo 9-Internal view 2 back side (CESS466-250-01D)

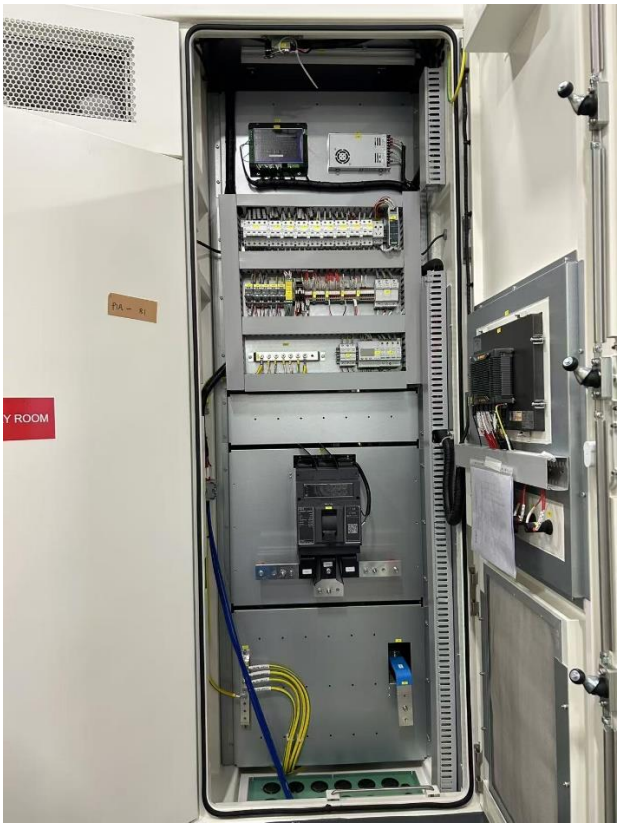


Photo 10- Auxiliary Power cabinet



Photo 11- Battery rack with PCS



Photo 12-Switch gear and PCS module

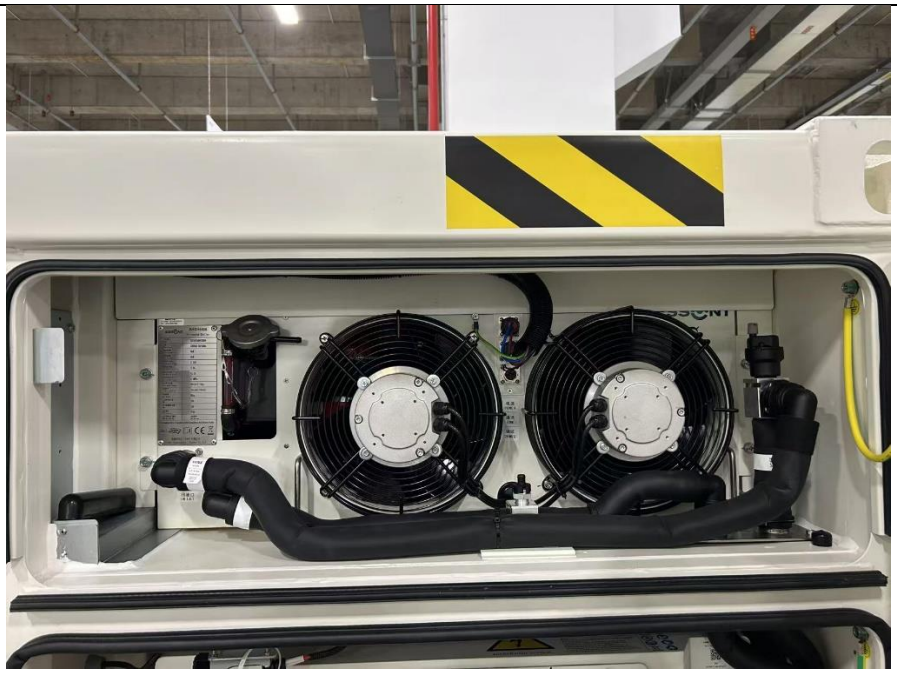


Photo 13-Liquid-cooling system



Photo 14-Fire panel



Photo 15-Air conditioner



Photo 16- Controller Computer



Photo 17- 24V Power supply

Legenda toegepaste uitzonderingsgrondslagen

In dit document zijn gegevens definitief geanonimiseerd op grond van:

Wet	Artikel	Omschrijving	Pagina's
Wet open overheid	Art. 5.1 lid 2 sub e	De eerbiediging van de persoonlijke levenssfeer	1, 3, 36, 90, 312, 648
Burgerlijk wetboek 6	Art. 6:230b BW	Dit gegeven hoeft volgens art. 6:230b BW alleen verstrekt te worden aan de afnemer van de verleende diensten.	350