№： 03401-23-12068C-S

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中国认可
国际互认
检测
TESTING
CNAS L0983

Test Report

Name of products： Pre-intelligent Low-voltage Equipment

Model： BlokSeT 5000

Client： Nanjing Aubo Electric Co., LTD

Type of test： TYPE TEST

Hunan Electric Research Institute Testing Group Co., Ltd.

电科院检测集团有限公司
检验检测专用章

Name of product	Pre-intelligent **Low-voltage E**quipment			**Trade mark**	/
Type	BlokSeT 5000				
Technical parameters	Ue:400V、380V; Ui:1000V（#1、#2）、690V（#3）; Fn: 50Hz; Main busbars: InA:4000A～1600A; Main busbars: Icw: 80kA; Indoor; IP43、IP42、IP41、IP40、IP30 EMC: Environnement A.				
Kind of test	TYPE TEST				
Applicant	Nanjing Aubo Electric Co., LTD		**Address**	No.15, Zhufeng Road, Zhuzhen Town, Luhe District, Nanjing	
Manufacturer	Nanjing Aubo Electric Co., LTD		**Address**	No.15, Zhufeng Road, Zhuzhen Town, Luhe District, Nanjing	
Number of samples	3	**Sampler**	/	**Product number**	/
Sampling date	/	**Date of receiving samples**		2023.12.10	
Samples number	#1~#3				
Standard:	IEC 61439-2:2020《Low-voltage switchgear and controlgear assemblies–Part 2: Power switchgear and controlgear assemblies》 GB/T 7251.8《Low-voltage switchgear and controlgear assemblies—Part 8: General technical requirements for intelligent assembly》				
Test date	**2023.12.10~2023.12.30**				
Test results	**Please see the “Test items summary”** **Date of Issue: 2023.12.30**				
Remark	/				

Approved by: 李帅 Verified by: 徐艳 Edited by: 向东

Test items summary			
Sequence/No.	**Test items**	**Subclause**	**Test results**
1	Wiring,operational performance and function	11.10	Pass
2	Resistance to corrosion	10.2.2	Pass
3	Verification of shell thermal stability	10.2.3.1	N/A
4	Verification of resistance of insulating materials to abnormal heat and fire due to internal electric effects	10.2.3.2	Pass
5	Ultraviolet (UV) radiation resistance verification	10.2.4	N/A
6	Lifting	10.2.5	Pass
7	Mechanical impact test	10.2.6	N/A
8	Sign	10.2.7	N/A
9	Mechanical operation	10. 2. 8	Pass
10	Protection grade of complete equipment	10.3	Pass
11	Electrical clearance and creepage distance	10.4	Pass
12	Protection against electric shock and integrity of protective circuits	10.5	Pass
13	Incorporation of switching devices and components	10.6	Pass
14	Internal electrical circuits and connections	10.7	Pass
15	Terminals for external conductors	10.8	Pass
16	Dielectric properties	10.9	Pass
17	Verification of temperature rise	10.10	Pass
18	Short circuit tolerance strength	10.11	Pass
19	EMC	10.12	P/See subcontracting report：1W232158
	—end—		

Photos





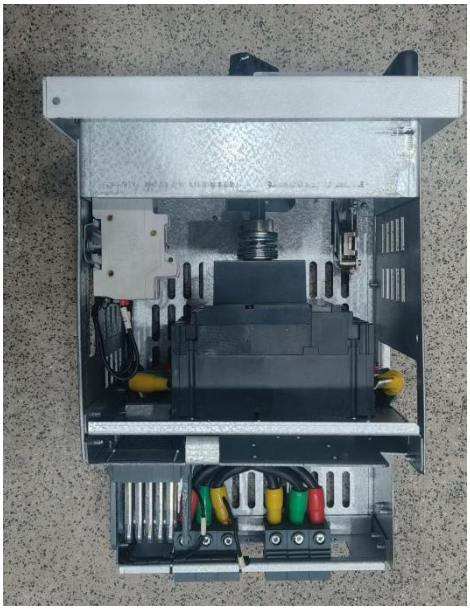
Photos



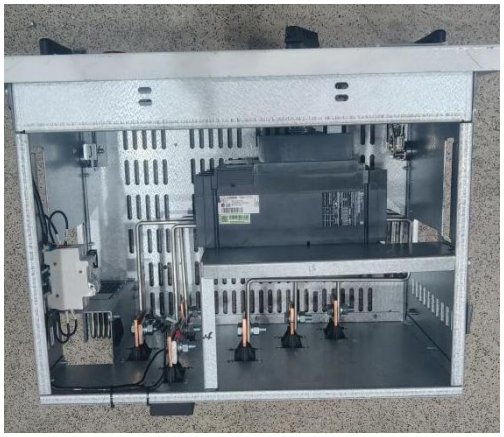


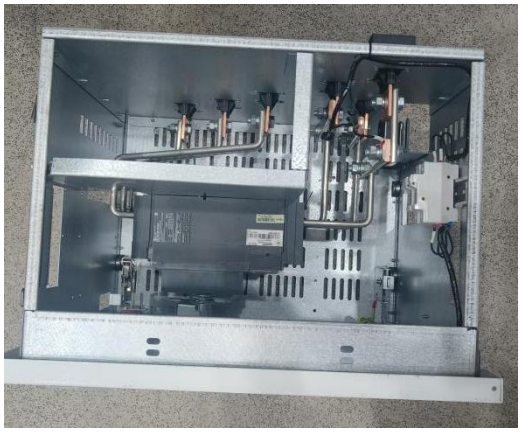
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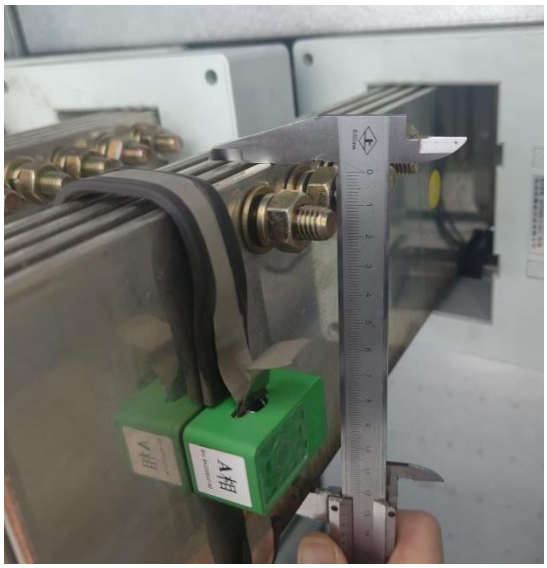


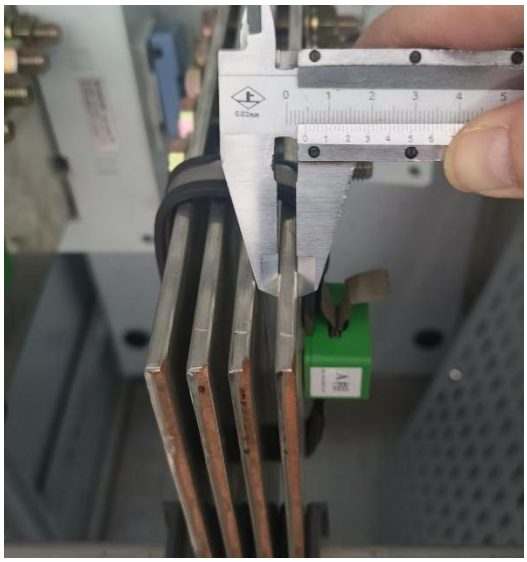






Photos











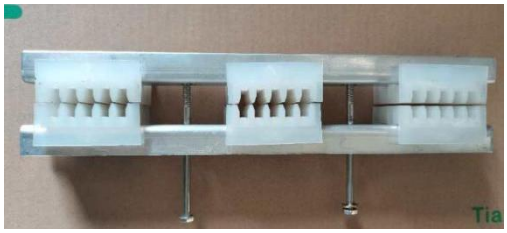




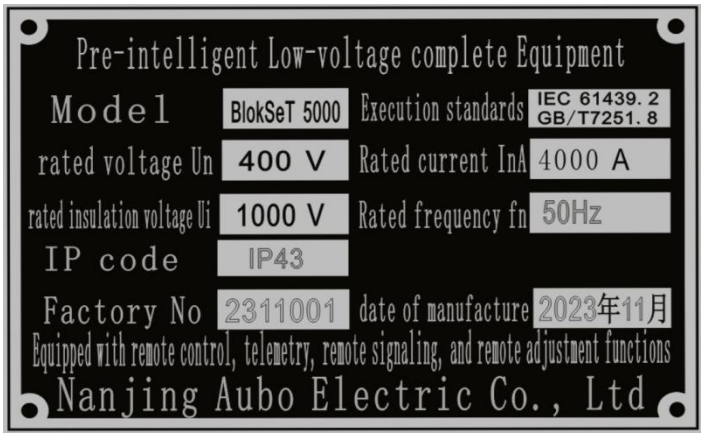


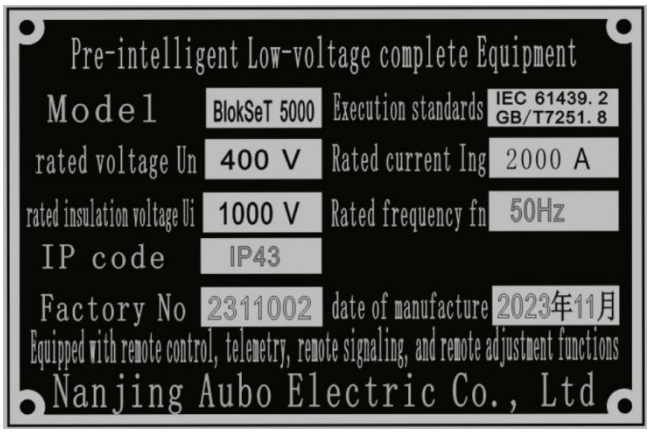
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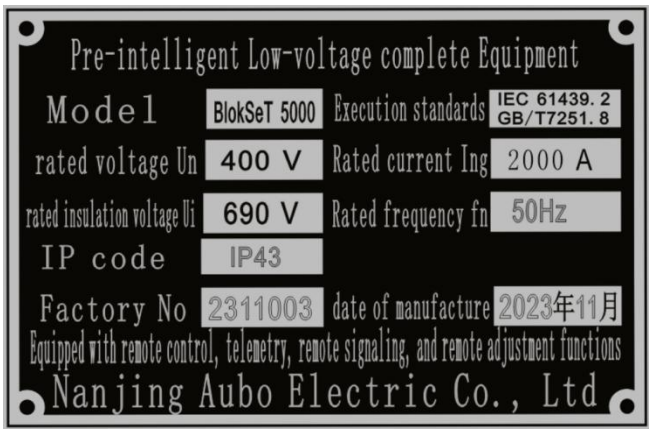







Pre-intelligent Low-voltage complete Equipment
Model
BlokSeT 5000
Execution standards
IEC 61439. 2
GB/T7251. 8
rated voltage Un
400 V
Rated current InA
4000 A
rated insulation voltage Ui
1000 V
Rated frequency fn
50Hz
IP code
IP43
Factory No
2311001
date of manufacture
2023年11月
Equipped with remote control, telemetry, remote signaling, and remote adjustment functions
Nanjing Aubo Electric Co., Ltd


Pre-intelligent Low-voltage complete Equipment
Model
BlokSeT 5000
Execution standards
IEC 61439. 2
GB/T7251. 8
rated voltage Un
400 V
Rated current Ing
2000 A
rated insulation voltage Ui
1000 V
Rated frequency fn
50Hz
IP code
IP43
Factory No
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date of manufacture
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Equipped with remote control, telemetry, remote signaling, and remote adjustment functions
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Pre-intelligent Low-voltage complete Equipment
Model
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Execution standards
IEC 61439. 2
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rated voltage Un
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Clause No.	Test items and requirements	Observed #1#2#3	Verdict
11.10	Wiring,operational performance and function		Pass
	1. Check the effectiveness of mechanical actuating elements, interlocks, locks, etc.	Compliance	
	2. The conductors and cables shall be checked for proper laying and the devices for proper mounting.	Compliance	
	3. Check the devices for proper mounting.	Compliance	
	Indicating instruments that need to be read by the operator are located within a zone between 0.2 m and 2,2 m above the base of the ASSEMBLY.		
	Operating devices such as handles, push buttons, or similar are located at such a height that they can easily be operated; this means that their centreline are located within a zone between 0.2 m and 2 m above the base of the ASSEMBLY.		
	Actuators for emergency switching devices (see 536.4.2 of IEC 60364-5-53) are accessible within a zone between 0.8 m and 1.6 m above the base of the ASSEMBLY	/	
	4. The terminals, excluding terminals for protective conductors, are situated at least 0.2 m above the base of the ASSEMBLIES and, moreover, be so placed that the cables can be easily connected to them.	Compliance Compliance	
	5. Terminals for external conductors	Compliance	
	6. Check the screwed and bolted connections for adequate contact.	Compliance	
	7. Check the completion of the information and markings, and whether the ASSEMBLY corresponds to these.	Compliance	
	8. Check the conformity of the assemblies to the circuit and wiring diagrams, technical data, etc., provided by the manufacture.	Compliance	
	9. Carry out an electrical functioning test.	Compliance	
	10.For the withdrawable parts, remove from its compartments for 2 times. the connected position, test position and disconnected position shall be complied with.	Compliance	
	11.Inspection of nameplate and marking manufacturer's name or trademark type designation or serial number.		

Clause No.	Test items and requirements	Observed #1#2#3	Verdict
10.2.2	Resistance to corrosion The mechanical, electrical and thermal capability of constructional materials and parts of the ASSEMBLY shall be deemed to be proven by verification of construction and performance characteristics. Severity test A: metallic indoor enclosures external metallic parts of indoor ASSEMBLIES internal metallic parts of indoor and outdoor ASSEMBLIES upon which intended mechanical operation may depend. 1) The test consists of 6 cycles of 24h each to damp heat cycling test according to IEC 60068-2-30 (Test Db) at (40 ± 3) °C and relative humidity of 95 % and 2 cycles of 24h each to salt mist test according to IEC 60068-2- 11; (Test Ka: Salt mist), at a temperature of (35 ± 2)°C. Salt solution concentration:(5±1)% Results to be obtained: After the test, the enclosure or samples are washed in running tap water for 5 min, rinsed in distilled or demineralized water then shaken or subjected to air blast to remove water droplets. The specimen under test is then stored under normal service conditions for 2 h. Compliance is checked by visual inspection to determine that: – there is no evidence of iron oxide, cracking or other deterioration more than that allowed by ISO 4628-3 for a degree of rusting Ri1. However surface deterioration of the protective coating is allowed. In case of doubt associated withpaints and varnishes, reference is made to ISO 4628-3 to verify that the samples conform to the specimen Ri1; – the mechanical integrity is not impaired; – seals are not damaged; –doors, hinges, locks, and fastenings work without abnormal effort.	Samples (hinges, locks, fasteners, shells, etc.) 25-40℃,93-98%，6days 144h 24h 35°C 5.0 Compliance	Pass

Clause No.	Test items and requirements	Observed #1#2#3	Verdict
10.2.3.1	Verification of shell thermal stability The thermal stability of enclosures made of insulating materials shall be verified by dry heat tests. This test shall not be carried out on parts that are not of technical significance and are used only for decorative purposes. The test was conducted according to IEC 60068-2-2:2007 test Bb. Sample name and material: The test temperature was 70℃ with natural ventilation for 168h and 96h after recovery. Result discriminant: after normal vision or corrected visual acuity visual no additional amplification equipment enclosure or sample, no visible cracks, its material also did not become sticky or greasy (methods: wrap a piece of dry cloth in the index finger, with additional samples of 5 n force press samples should be no traces of cloth and shell or samples of materials not glued to the cloth.)	Switch Mask PC 70℃, 168h, 96h recovery Compliance	N/A

Clause No.	Test items and requirements	Observed #1#2#3	Verdict
10.2.3.2	Verification of resistance of insulating materials to abnormal heat and fire due to internal electric effects parts necessary to retain current-carrying parts in position; Material time environmental humidity test temperature ta=30± 1s ti（s） te≤ta+30s Results to be obtained: There is no visible flame and no sustained glowing, or flames and glowing of the specimen extinguish within 30 s after removal of the glow-wire. There is no burning of the tissue paper or scorching of the pinewood board. material environmental humidity:45%~75% Time The temperature at the top of the hot wire ta=30± 1s ti（s） te≤ta+30s Results to be obtained: There is no visible flame and no sustained glowing, or flames and glowing of the specimen extinguish within 30 s after removal of the glow-wire. There is no burning of the tissue paper or scorching of the pinewood board.	Insulator 、 Busbar Clamp 、 Connector：DMC 24h 17℃~19℃ 54%~62% 962°C 30 1.5 2.0 2.5 31.5 32.0 32.5 Compliance /	Pass

Clause No.	Test items and requirements	Observed #1#2#3	Verdict
10.2.5	Lifting The maximum number of sections allowed by the original manufacturer to be lifted together are equipped with components and/or weights to achieve a weight of 1.25 times its maximum shipping weight. With doors closed it is lifted with the specified lifting means and in the manner defined by the original manufacturer. From a standstill position, the ASSEMBLY is raised smoothly without jerking in a vertical plane to a height of (1 ±0. 1) m and lowered in the same manner to a standstill position. This test is repeated a further two times after which the ASSEMBLY is raised up and suspended for 30 min at a height of (1 ±0. 1) m without any movement. Following this test the ASSEMBLY is raised smoothly without jerking from a standstill position to a height of (1 ±0. 1) m and moved (10 ±0.5) m horizontally, then lowered to a standstill position. This sequence, is carried out three times at uniform speed, each sequence being carried out within 1 min. During the test, with the test weights in place, the ASSEMBLY shows no deflections and after the test shows no cracks or permanent distortions visible to normal or corrected vision without additional magnification, which could impair any of its characteristics.	Weight of sample:1412 kg 1,25 times: 1766 kg 1m;10m 51s;53s;50s Compliance	Pass

Clause No.	Test items and requirements	Observed #1#2#3	Verdict
10.2.8	Mechanical operation For parts, which need verification by test, satisfactory mechanical operation is verified after installation in the ASSEMBLY. The number of operating cycles is 200. After the tests: a)At the same time, the operation of the mechanical interlocks associated with these movements is checked. b)The test is passed if the operating conditions of the apparatus, interlocks, specified degree of protection etc., have not been impaired and if the effort required for operation is practically the same as before the test. c)In the case of withdrawable parts, the operating cycle includes any physical movements from the connected to the isolated position and back to the connected position.	Compliance Compliance Compliance	Pass

Clause No.	Test items and requirements	Observed	Verdict
		#1#2#3	
10.3	Degree of protection of assemblies		Pass
	IP43	IP43	
	The degree of protection provided shall be verified according to IEC 60529:2013		
	First characteristic numeral:4		
	Rigid steel $\phi 1.0_{0}^{+0.05}$mm diameter with edges free from burrs;Test force:1.0±0.1N; The object probe shall not penetrate at all.	Compliance	
	Second characteristic numeral: 3		
	Water flow rate: 10（1±5%）L/min Duration of test: ≥5min Vertically falling drops shall have no harmful effects	Compliance	
	Verification of the dielectric properties after the tests:	No puncture or flashover	
	Ui:	1000V（#1、#2）690V(#3)	
	Ambient temperature:	18℃ 19℃	
	Humidity:	61% 61%	
	Atmospheric pressure:	1028hPa 1029hPa	
	Test voltage:		
	Applied time: 60s	2200V/1890V	
	Applied as follows:	60s	
	a) between all live parts of all poles connected together and the frame of the circuit-breaker.	No disruptive discharge	
	b) between each pole and all the other poles connected tothe frame of the circuit-breaker.	No disruptive discharge	

Clause No.	Test items and requirements			Observed #1#2#3		Verdict
10.4	Clearances and creepage distances					Pass
	Item	Testing points	Limit (mm)	Measured value(mm)		
	clearances	Between the phases	≥8mm	15.5	15.8	
		Between all live parts and conductive parts	≥8mm	18.5	18.8	
	Creepage distances	Between the phases	≥16mm	26.5	26.8	
		Between all live parts and conductive parts	≥16mm	23.5	23.8	
	Disconnect distances	Between vertical busbar and function unit when separated	≥/mm	/	/	

Clause No.	Test items and requirements			Observed		Verdict
				#1#2#3		
10.5	Protection against electric shock and integrity of protective circuits					Pass
	No.	Testing points	Limit (mΩ)	Measured value（mΩ）		
	1	#1 Between the main grounding end of the cabinet and the instrument door	≤100	7.7	7.9	
	2	#1 Between the main grounding end of the cabinet and the door lock	≤100	19.9	20.5	
	3	#1 Between the main grounding end of the cabinet and the mounting bracket of electrical components	≤100	3.4	3.8	
	4	#1 Between the main grounding end of the cabinet and the mounting bracket of electrical components	≤100	4.1	4.5	
	5	#1 Between the main grounding end of the cabinet and the cabinet rack	≤100	2.9	3.3	
	No.	Testing points	Limit (mΩ)	Measured value（mΩ）		
	1	#2 Between the main grounding end of the cabinet and the instrument door	≤100	6.9	7.4	
	2	#2 between the cabinet main grounding end and the door lock	≤100	17.7	17.9	
	3	#2 Between the main grounding end of the cabinet and the mounting bracket of electrical components	≤100	4.5	4.6	
	4	#2 Between the main grounding end of the cabinet and the mounting bracket of electrical components	≤100	4.1	4.5	
	5	#2 Between the main grounding end of the cabinet and the cabinet rack	≤100	3.5	3.9	

Clause No.	Test items and requirements				Observed #1	Observed #2	Observed #3	Verdict
	Pull-out functional unit							
	1	The main grounding terminal of the cabinet is connected to C1 Between the bottom plate of the pull-out functional unit	working position	≤100	2.7	3.2		
			testing position	≤100	2.4	2.8		
			isolated location	≤100	1.8	2.2		
	2	The main grounding terminal of the cabinet is connected to C5 Between the bottom plate of the pull-out functional unit	working position	≤100	2.1	2.4		
			testing position	≤100	2.2	2.5		
			isolated location	≤100	1.7	1.9		
	3	Cabinet main ground terminal with C7 Between the bottom plate of the pull-out functional unit	working position	≤100	1.4	1.8		
			testing position	≤100	1.8	2.2		
			isolated location	≤100	2.3	2.5		
	4	Cabinet main grounding terminal with / Between the bottom plate of the pull-out functional unit	working position	≤100	/	/		
			testing position	≤100	/	/		
			isolated location	≤100	/	/		
	5	Cabinet main grounding terminal with / Between the bottom plate of the pull-out functional unit	working position	≤100	/	/		
			testing position	≤100	/	/		
			isolated location	≤100	/	/		
	The protection circuit continuity of the extractable component from the connected position to the isolated position shall maintain its effectiveness.							

Clause No.	Test items and requirements	Observed #1#2#3	Verdict
10.6	Incorporation of switching devices and components 1.Fixed parts For fixed parts, the connections of the main circuits shall only be connected or disconnected when the ASSEMBLY is not under voltage. Removal and installation of fixed parts requires the use of a tool. The disconnection of a fixed part shall require the isolation of the complete ASSEMBLY or part of it. In order to prevent unauthorized operation, the switching device may be provided with means to secure it in one or more of its positions. 2.Removable and withdrawable parts The removable and withdrawable parts are so constructed that their electrical equipment can be safely isolated from or connected to the main circuit whilst this circuit is live. The removable and withdrawable parts may be provided with an insertion interlock Minimum clearances and creepage distances are complied with in the different positions as well as during transfer from one position to another. Withdrawable parts have in addition an isolated position and may have a test position or a test situation Withdrawable parts are distinctly located in these positions. These positions are clearly discernible. In PSC-ASSEMBLIES with withdrawable parts all live parts are protected in such a manner that they cannot unintentionally be touched when the door, if any, is open and the withdrawable part is withdrawn from the connected position or removed. Where an obstacle or shutter is used they meet the requirements of 8.4.6.2.5 of Part 1, and warning labels are provided. Unless otherwise specified, withdrawable parts are fitted with a device, which ensures that the apparatus can only be withdrawn and/or re-inserted after its main circuit has been interrupted. In order to prevent unauthorized operation, withdrawable parts may be provided with means for a padlock or lock to secure them in one or more of their positions. 3. Selection of switching devices and components Switching devices and components incorporated in ASSEMBLIES comply with the relevant standards. The switching devices and components shall be suitable for the specific purpose of the configuration design of the complete set of equipment (e.g., open type or closed type) and for their rated voltage, rated current, rated frequency, service life, on and off capacity, short-circuit tolerance strength, etc. The rated insulation voltage and rated shock withstand voltage of the device installed in the circuit shall be equal to or higher than the corresponding values specified in the circuit.	Compliance / Compliance	Pass

Clause No.	Test items and requirements	Observed #1#2#3	Verdict
10.6	4.Installation of switching devices and components Switching devices and components are installed and wired in the ASSEMBLY in accordance with instructions provided by their manufacturer and in such a manner that their proper functioning is not impaired by interaction, such as heat, switching emissions, vibrations, electromagnetic fields, which are present in normal operation.In the case of electronic assemblies, this may necessitate the separation or screening of all electronic signal processing circuits. When fuses are installed the original manufacturer shall state the type and rating of the fuselinks to be used. 5.Accessibility Adjusting and resetting devices, which have to be operated inside the ASSEMBLY are easily accessible. Functional units mounted on the same support (mounting plate, mounting frame) and their terminals for external conductors are so arranged as to be accessible for mounting, wiring, maintenance and replacement. Unless otherwise agreed between the ASSEMBLY manufacturer and the user the following accessibility requirements associated with floor-mounted ASSEMBLIES apply: –The terminals, excluding terminals for protective conductors, are situated at least 0,2 m above the base of the ASSEMBLIES and, moreover, be so placed that the cables can be easily connected to them. – Indicating instruments that need to be read by the operator are located within a zone between 0,2 m and 2,2 m above the base of the ASSEMBLY. – Operating devices such as handles, push buttons, or similar are located at such a height that they can easily be operated; this means that their centreline are located within a zone between 0,2 m and 2 m above the base of the ASSEMBLY. Devices which are infrequently operated, e.g less than once per month, may be installed at a height up to 2,2 m. –Actuators for emergency switching devices are accessible within a zone between 0,8 m and 1,6 m above the base of the ASSEMBLY 6.Barriers Barriers for manual switching devices are so designed that the switching emissions do not present a danger to the operator. To minimize danger when replacing fuse-links, interphase barriers are applied, unless the design and location of the fuses makes this unnecessary. 7.Direction of operation and indication of switching positions The operational positions of components and devices are clearly identified. If the direction of operation is not in accordance with IEC 60447, then the direction of operation is clearly identified. 8.Indicator lights and push-buttons Unless otherwise specified in the relevant product standard the colours of indicator lights and push-buttons are in accordance. with IEC 60073. 9.Power factor correction banks For power factor correction banks incorporated in assemblies, the requirements of IEC 61921:2017 shall be met.	Compliance / Compliance / Compliance Compliance /	

Clause No.	Test items and requirements	Observed #1#2#3	Verdict
10.7	Internal electrical circuits and connections		Pass
	1.Main circuits	Compliance	
	The busbars (bare or insulated) shall be arranged in such a manner that an internal shortcircuit is not to be expected. They shall be rated at least in accordance with the information concerning the short-circuit withstand strength and designed to withstand at least the short-circuit stresses limited by the protective device(s) on the supply side of the busbars. Within one section, the conductors (including distribution busbars) between the main busbars and the supply side of functional units as well as the components included in these units may be rated on the basis of the reduced short-circuit stresses occurring on the load side of the respective short-circuit protective device within each unit, provided that these conductors are arranged so that under normal operation an internal short-circuit between phases and/or between phases and earth is not to be expected. Unless otherwise agreed between the ASSEMBLY manufacturer and the user, the minimum cross-sectional area of the neutral within a three phase and neutral circuit shall be: ・ For circuits with a phase conductor cross-sectional area up to and including 16 mm^2,100 % of that of the corresponding phases. ・ For circuits with a phase conductor cross-sectional area above 16 mm^2,50 % of that of the corresponding phases with a minimum of 16 mm^2.		
	It is assumed that the neutral currents do not exceed 50 % of the phase currents. 2.Auxiliary circuits	Compliance	
	The design of the auxiliary circuits shall take into account the supply earthing system and ensure that an earth-fault or a fault between a live part and an exposed conductive part shall not cause unintentional dangerous operation. In general, auxiliary circuits shall be protected against the effects of short circuits. However, a short-circuit protective device shall not be provided if its operation is liable to cause a danger. In such a case, the conductors of auxiliary circuits shall be arranged in such a manner that a short-circuit is not to be expected.	Compliance	
	3.Bare and insulated conductors		
	The connections of current-carrying parts shall not suffer undue alteration as a result of normal temperature rise, ageing of the insulating materials and vibrations occurring in normal operation. In particular, the effects of thermal expansion and of the electrolytic action in the case of dissimilar metals, and the effects of the endurance of the materials to the temperatures attained, shall be taken into consideration. Connections between current-carrying parts shall be established by means that ensure a sufficient and durable contact pressure.		

Clause No.	Test items and requirements	Observed #1#2#3	Verdict
10.7	If verification of temperature rise is carried out on the basis of tests the selection of conductors and their cross-sections used inside the ASSEMBLY shall be the responsibility ofthe original manufacturer. If verification of temperature rise is made following the rules of 10.10.3, the conductors shall have a minimum cross-section according to IEC 60364-5-52. Examples on how to adapt this standard for conditions inside an ASSEMBLY are given in the tables included in Annex H. In addition to the current-carrying capacity of the conductors, the selection is governed by: – the mechanical stresses to which the ASSEMBLY may be subjected; – the method used to lay and secure the conductors; – the type of insulation; – the type of components being connected (e.g. switchgear and controlgear in accordance with IEC 60947 series; electronic devices or equipment). In the case of insulated solid or flexible conductors: In the case of insulated solid or flexible conductors: – They shall be rated for at least the rated insulation voltage (see 5.2.3) of the circuit concerned. – Conductors connecting two termination points shall have no intermediate joint, e.g. spliced or soldered. – Conductors with only basic insulation shall be prevented from coming into contact with bare live parts at different potentials. – Contact of conductors with sharp edges shall be prevented. – Supply conductors to apparatus and measuring instruments in covers or doors shall be so installed that no mechanical damage can occur to the conductors as a result of movement of these covers or doors. – Soldered connections to apparatus shall be permitted in ASSEMBLIES only in cases where provision is made for this type of connection on the apparatus and the specified type of conductor is used. – For apparatus other than those mentioned above, soldering cable lugs or soldered ends of stranded conductors are not acceptable under conditions of heavy vibration. In locations where heavy vibrations exist during normal operation, for example in the case of dredger and crane operation, operation on board ships, lifting equipment and locomotives, attention should be given to the support of conductors. – Generally only one conductor should be connected to a terminal; the connection of two or more conductors to one terminal is permissible only in those cases where the terminals are designed for this purpose. The dimensioning of solid insulation between separate circuits shall be based on the circuit of highest rated insulation voltage.		

Clause No.	Test items and requirements	Observed #01#02#03	Verdict
10.7	4. Selection and installation of non-protected live conductors to reduce the possibility of short-circuits: Live conductors in an ASSEMBLY that are not protected by short-circuit protective devices shall be selected and installed throughout the entire ASSEMBLY in such a manner that an internal short-circuit between phases or between phase and earth is a remote possibility. The distance between t the main busbar and each respective SCPD should not exceed 3m when unprotected live conductors are selected and installed according to regulations.	/	
	5. Identification of the conductors of main and auxiliary circuits The method and the extent of identification of conductors, for example by arrangement, colours or symbols, on the terminals to which they are connected or on the end(s) of the conductors themselves, is the responsibility of the ASSEMBLY manufacturer and shall be in agreement with the indications on the wiring diagrams and drawings. Where appropriate, identification according to IEC 60445 shall be applied.	Compliance	
	6.Identification of the protective conductor (PE, PEN) and of the neutral conductor (N) of the main circuits The protective conductor shall be readily distinguishable by location and/or marking or colour. If identification by colour is used, it shall only be green and yellow (twin-coloured), which is strictly reserved for the protective conductor. When the protective conductor is an insulated single-core cable, this colour identification shall be used, preferably throughout the whole length. Any neutral conductor of the main circuit shall be readily distinguishable by location and/or marking or colour.	Compliance	
	7. Conductors in AC circuits passing through ferromagnetic enclosures or plates Where conductors in AC circuits with a current rating exceeding 200 A pass through ferromagnetic enclosures, sections or plates, they shall: - be arranged such that the conductors are only collectively surrounded by ferromagnetic material, e.g. pass through the same hole; or - arrangements where conductors pass through separate holes shall have been verified by temperature-rise test(s). It is permitted for an additional protective conductor to enter the ferrous enclosure individually.	Compliance	
	8. Cooling If special precautions are required at the place of installation to ensure proper cooling, the assembly manufacturer shall furnish the necessary information (for instance indication of the need for spacing with respect to parts that are liable to impede the dissipation of heat or produce heat themselves).	/	

Clause No.	Test items and requirements	Observed #01#02#03	Verdict
10.8	Terminals for external conductors		Pass
	The ASSEMBLY manufacturer shall indicate whether the terminals are suitable for connection of copper or aluminium conductors, or both. The terminals shall be such that the external conductors may be connected by a means (screws, connectors, etc.) which ensures that the necessary contact pressure corresponding to the current rating and the short-circuit strength of the apparatus and the circuit is maintained.	Compliance	
	In the absence of a special agreement between the ASSEMBLY manufacturer and the user,terminals shall be capable of accommodating copper conductors from the smallest to the largest cross-sectional areas corresponding to the appropriate rated current (see Annex A).	Compliance	
	Where aluminium conductors are to be terminated, the type, size and termination method of the conductors shall be as agreed between the ASSEMBLY manufacturer and the user.	/	
	In the case where external conductors for electronic circuits with low level currents and voltages (less than 1 A and less than 50 V a.c. or 120 V d.c.) have to be connected to an ASSEMBLY, Table A.1 does not apply.		
	The available wiring space shall permit proper connection of the external conductors of the indicated material and, in the case of multicore cables, spreading of the cores.	Compliance	
	The conductors shall not be subjected to stresses, which are likely to reduce their normal life expectancy.		
	Unless otherwise agreed between the ASSEMBLY manufacturer and the user, on three-phase and neutral circuits, terminals for the neutral conductor shall allow the connection of copper conductors having a minimum cross-sectional area: – equal to half the cross-sectional area of the phase conductor, with a minimum of 16 mm^2,if the size of the phase conductor exceeds 16 mm^2; – equal to the full cross-sectional area of the phase conductor, if the size of the latter is less than or equal to 16 mm^2.		
	If connecting facilities for incoming and outgoing neutral, protective and PEN conductors are provided; they shall be arranged in the vicinity of the associated phase conductor terminals. Openings in cable entries, cover plates, etc., shall be so designed that, when the cables are properly installed, the stated protective measures against contact and degree of protection shall be obtained. This implies the selection of means of entry suitable for the application as stated by the ASSEMBLY manufacturer.	Compliance	
	The terminals for external protective conductors shall be marked according to IEC 60445. As an example see graphical symbol No. 5019 of IEC 60417. This symbol is not required where the external protective conductor is intended to be connected to an internal protective conductor, which is clearly identified with the colours green and yellow.	Compliance	

Clause No.	Test items and requirements	Observed #1#2#3	Verdict
10.8	The terminals for external protective conductors (PE, PEN) and metal sheathing of connecting cables (steel conduit, lead sheath, etc.) shall, where required, be bare and, unless otherwise specified, suitable for the connection of copper conductors. A separate terminal of adequate size shall be provided for the outgoing protective conductor(s) of each circuit.	Compliance	
	Unless otherwise agreed between the ASSEMBLY manufacturer and the user, terminals for protective conductors shall allow the connection of copper conductors having a cross-section depending on the cross-section of the corresponding phase conductors.	Compliance	
	In the case of enclosures and conductors of aluminium or aluminium alloys, particular consideration shall be given to the danger of electrolytic corrosion. The connecting means to ensure the continuity of the conductive parts with external protective conductors shall have no other function.	/	
	Identification of terminals shall comply with IEC 60445 unless otherwise stated.	Compliance	

Clause No.	Test items and requirements	Observed #1#2#3	Verdict
10.9 10.9.2	Dielectric properties Power-frequency withstand voltage	1000V（#1#2）690V（#3）	Pass
	Ambient temperature:	18℃	
	Humidity(%):	61%	
	Atmospheric pressure:	1028hPa	
	Test voltage:2200V ±3%	2200V（#1#2）/1890（#3）	
	Applied time: 60s	60s	
	Applied as follows:		
	a) between all the poles of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the earthed enclosure, with the main contacts of all switching devices in the closed position or bridged by a suitable low resistance link;	No breakdown and discharge phenomenon	
	b) between each pole of the main circuit and, the other poles and the earthed enclosure connected together, with the main contacts of all switching devices in the closed position or bridged by a suitable low resistance link;	No breakdown and discharge phenomenon	
	c) between live parts and the external operating handles of insulating material. 2.835kV±3%	No breakdown and discharge phenomenon	
	Acceptance criteria： The overcurrent relay shall not operate and there shall be no disruptive discharge during the tests.	Compliance	

Clause No.	Test items and requirements	Observed #1#2#3	Verdict
10.9.3	Impulse withstand voltage test		
	Ambient temperature:	18℃	
	Humidity:	61%	
	Atmospheric pressure:	1028hPa	
	Altitude:	41m	
	The 1,2/50μs impulse voltage is applied to the ASSEMBLY five times for each polarity at intervals of 1 s minimum as follows:	1,2/50 μs	
	The impulse voltage：9.8kV±3%	10.0 kV	
	Interval time:≥ 1s	45s	
	Test times：±5	5	
	Oscillogram No.:	2312068 #01-#22	
	Applied as follows:		
	a) between all the poles of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the earthed enclosure, with the main contacts of all switching devices in the closed position or bridged by a suitable low resistance link;	No breakdown and discharge phenomenon	
	b) between each pole of the main circuit and, the other poles and the earthed enclosure connected together, with the main contacts of all switching devices in the closed position or bridged by a suitable low resistance link;	No breakdown and discharge phenomenon	
	c) The impulse withstand voltage capability ofthe isolating distance between the withdrawable units' main contacts and their associated fixed contacts（/kV±3%）	/	
	Acceptance criteria：		
	There shall be no disruptive discharge during the tests.	Compliance	

Clause No.	Test items and requirements	Observed #1#2#3	Verdict
10.10 the first time	Verification of temperature-rise limits RDF： 1 Ambient temperature:+10 ～+40 ℃ the complete ASSEMBLY Circuit number： Incoming circuit 1 Circuit current：Main busbars $4000_0^{+3\%}$ （A） Cable cross-section: TMY 4(10×100) mm² × m Circuit number： 2-C1 Circuit current：$1000_0^{+3\%}$ （A） Cable cross-section:2(5×60) mm² × m Circuit number： 3-C1 Circuit current：$110_0^{+3\%}$ （A） Cable cross-section:35 mm² × m Circuit number： 3-C5 Circuit current：$320_0^{+3\%}$ （A） Cable cross-section: 185 mm² × m Circuit number： 3-C7 Circuit current：$460_0^{+3\%}$ （A） Cable cross-section: 2×150 mm² × m Circuit number： 3-C Circuit current：$/_0^{+3\%}$ （A） Cable cross-section: / mm² × m Circuit number： 3-C Circuit current：$/_0^{+3\%}$ （A） Cable cross-section: / mm² × m The diagram of tested arrangements The test time:	17.7℃ 4011 TMY 4(10×100)length 3 m 1007 BVR 2(5×60) mm² length 3 m 112 BVR :35 mm² length 5m 323 BVR 185 mm² length 5m 463 BVR 2×150 mm² length 5m BVR / mm² length /m BVR / mm² length /m 6h	Pass

Clause No.	Test items and requirements			Observed				Verdict
				#1#2#3				
	No.	Testing points	Limit (K)	A（K）	B（K）	C（K）	N（K）	
	a1	incoming line terminal	≤70K	47	47	46		
	a2	Bus fixed connection	≤70K	57	58	54		
	a3	Inlet end of main circuit breaker	≤70K	61	63	61		
	a4	Outbound end of the main circuit breaker	≤70K	47	47	48		
	a5	Bus fixed connection	≤70K	44	49	46		
	a6	Bus fixed connection	≤70K	47	47	44		
	a7	Horizontal bus connection	≤70K	43	48	45		
	a8	Horizontal bus connection	≤70K	46	46	44		
	insulated handle		≤25K	10				
	shell		≤30K	16				
	Air temperature around the main bus（℃）			46				
	Air temperature around the distribution bus（℃）			47				
	Air temperature around inlet and outlet of main switch（℃）			50				
	Fuse voltage drop:（V）			/				
	Power consumption of fuse:（W）			/				

Clause No.	Test items and requirements			Observed				Verdict
	No.	Testing points	Limit (K)	A(K)	B(K)	C(K)	N(K)	
	a9	Bus fixed connection	≤70K	43	44	44		
	a10	Inlet end of circuit breaker	≤70K	59	60	60		
	a11	Outlet end of circuit breaker	≤70K	54	57	58		
	a12	Outlet end of function unit	≤70K	43	46	45		
	insulated handle		≤25K	8				
	a13	Drawer connector joint	≤55K	43	46	45		
	a14	Inlet end of circuit breaker	≤70K	53	55	54		
	a15	Outlet end of circuit breaker	≤70K	58	58	57		
	a16	Drawer connector joint	≤55K	46	46	47		
	a17	Outlet end of function unit	≤70K	44	47	46		
	insulated handle		≤25K	4				
	a18	Drawer connector joint	≤55K	47	47	43		
	a19	Bus fixed connection	≤70K	45	47	48		
	a20	Inlet end of circuit breaker	≤70K	55	55	56		
	a21	Outlet end of circuit breaker	≤70K	59	60	57		
	a22	Bus fixed connection	≤70K	47	47	48		
	a23	Bus fixed connection	≤70K	43	48	47		
	a24	Drawer connector joint	≤55K	45	45	44		
	a25	Outlet end of function unit	≤70K	43	47	45		
	insulated handle		≤25K	3				
	a26	Drawer connector joint	≤55K	46	46	44		
	a27	Bus fixed connection	≤70K	47	47	48		
	a28	Inlet end of circuit breaker	≤70K	54	56	51		
	a29	Outlet end of circuit breaker	≤55K	59	60	57		
	a30	Bus fixed connection	≤70K	46	46	45		
	a31	Bus fixed connection	≤70K	47	47	44		
	a32	Drawer connector joint		44	45	46		
	a33	Outlet end of function unit		43	48	47		
	insulated handle		≤25K	2				

Clause No.	Test itemsand requirements	Observed #1 #2 #3	Verdict
10.11	Short circuit tolerance strength		Pass
	Main bus short circuit resistance strength verification	#1	
	test voltage：1.05×400$^{+5\%}$ V	425	
	Test current (effective value/peak value): 80.0/176$^{5\%}$ kA	80.5/180	
	cosφ：0.20 $_{-0.05}$	0.18	
	Endurance: 1s	1.03s	
	I^2t：6400（$\times10^6A^2s$）	6632	
	Schematic number of short circuit point:	See short circuit diagram	
	Expected current oscillogram No.	S202328003-Y	
	Test oscillogram No.	S202359042	
	#02Short circuit resistance strength verification of cabinet distribution bus	/	Pass
	test voltage：1.05×400$^{+5\%}$ V		
	Test current (effective value/peak value): 50/105$^{+5\%}$ kA		
	cosφ：0.25 $_{-0.05}$		
	Endurance: 1s		
	I^2t：2500（$\times10^6A^2s$）		
	Schematic number of short circuit point:		
	Expected current oscillogram No.		
	Test oscillogram No.		
	#02Short circuit resistance strength verification of cabinet distribution bus	#2	Pass
	test voltage：1.05×400$^{+5\%}$ V	425	
	Test current (effective value/peak value): 50105$^{+5\%}$ kA	50.8/108	
	cosφ：0.20 $_{-0.05}$	0.23	
	Endurance: 1s	1.03s	
	I^2t：2500（$\times10^6A^2s$）	2543	
	Schematic number of short circuit point:	See short circuit diagram	
	Expected current oscillogram No.	S202328006-Y	
	Test oscillogram No.	S202359044	

Clause No.	Test itemsand requirements	Observed #1 #2 #3	Verdict
10.11	#03Short circuit resistance strength verification of cabinet distribution bus	#3	Pass
	test voltage：1.05×400$^{+5\%}$ V	425	
	Test current (effective value/peak value): 50105$^{+5\%}$ kA	50.8/108	
	cosφ： 0.20 $_{-0.05}$	0.23	
	Endurance: 1s	1.02s	
	I^2t： 2500 （$\times10^6A^2s$）	2531	
	Schematic number of short circuit point: Expected current oscillogram No. Test oscillogram No.	See short circuit diagram S202328006-Y S202359045	
	Neutral bus short circuit resistance strength verification		Pass
	test voltage:1.05×230$^{+5\%}$ V	245	
	Test current (effective value/peak value): 48/101$^{+5\%}$ kA	48.6/103	
	cosφ： 0.25 $_{-0.05}$	0.23	
	Endurance: 1s	1.04	
	I^2t： 2304 （$\times10^6A^2s$）	2458	
	Schematic number of short circuit point: Expected current oscillogram No. Test oscillogram No.	See short circuit diagram S202328004-Y S202359043	

Clause No.	Test itemsand requirements	Observed #1#2#3	Verdict
	test result: a)After the test, if the electrical gap and creepage distance still conform to the provisions of 8.3, then the deformation of bus and conductor is acceptable. At this time, if there is any doubt about the electrical gap and creepage distance, measurement should be carried out; b)The insulation performance shall meet the requirements of the relevant equipment standards. The bus insulation parts, support parts, or cable fixers shall not be divided into two or more pieces, and no cracks shall occur on any surface of the support parts. c)The connecting parts of the wire should not be loose, and the wire should not fall off from the output terminal; d)The deformation of the busbar or structure of the complete set of equipment damages its normal use and should be regarded as failure; e)Any deformation of the busbar or structure of the complete set of equipment that damages the normal insertion or removal of removable components shall be regarded as failure; f)Deformation of shell or internal bulkhead, baffle and barrier due to short circuit is allowed, provided that there is no significant weakening of its protection class and the electrical clearance or creepage distance is not reduced below the value specified in 8.3; g)The melt to detect the fault current should not be fused; If in doubt, check whether the components packed into the complete set of equipment conform to the relevant specifications.	Compliance	
	Functional unit short circuit tolerance strength verification(Main breaker) test voltage：1.05×400$^{+5\%}$ V Test current (effective value):80.0$^{+5\%}$ kA cosφ： 0.20 $_{-0.05}$ I^2t： Faulty current detection fuse:Φ0.8mm，L≥50mm test number:1 time Schematic number of short circuit point: Expected current oscillogram No. Test oscillogram No.	425 80.5 0.18 270（×10^6A^2s） Φ0.8mm，L=50mm See short circuit diagram S202328003-Y S202359046	Pass

Clause No.	Test itemsand requirements	Observed #1#2#3	Verdict
	Functional unit short circuit tolerance strength verification（ #2-C1） test voltage：$1.05\times400^{+5\%}$ V Test current (effective value):$50.0^{+5\%}$ kA cosφ： $0.25\ ^{-0.05}$ I^2t： （$\times10^6A^2s$） Faulty current detection fuse:Φ0.8mm，L≥50mm test number:1 time Schematic number of short circuit point: Expected current oscillogram No. Test oscillogram No.	 425 50. 8 0.23 51.8 Φ0.8mm，L=50mm 1 See short circuit diagram S202328006-Y S202359047	Pass
	Functional unit short circuit tolerance strength verification（ #3-C1） test voltage：$1.05\times400^{+5\%}$ V Test current (effective value):$50.0^{+5\%}$ kA cosφ： $0.25\ ^{-0.05}$ I^2t： （$\times10^6A^2s$） Faulty current detection fuse:Φ0.8mm，L≥50mm test number:1 time Schematic number of short circuit point: Expected current oscillogram No. Test oscillogram No.	 425 50.8 0.23 1.13 Φ0.8mm，L=50mm 1 See short circuit diagram S202328006-Y S202359048	Pass
	Functional unit short circuit tolerance strength verification（ #3-C5） test voltage：$1.05\times400^{+5\%}$ V Test current (effective value):$50.0^{+5\%}$ kA cosφ： $0.25\ ^{-0.05}$ I^2t： （$\times10^6A^2s$） Faulty current detection fuse:Φ0.8mm，L≥50mm test number:1 time Schematic number of short circuit point: Expected current oscillogram No. Test oscillogram No.	 425 50.8 0.23 0.94 Φ0.8mm，L=50mm 1 See short circuit diagram S202328006-Y S202359049	Pass

Clause No.	Test itemsand requirements	Observed #1#2#3	Verdict
	Functional unit short circuit tolerance strength verification（ #3-C7） test voltage：$1.05\times400^{+5\%}$ V Test current (effective value):$50.0^{+5\%}$ kA cosφ： $0.25_{-0.05}$ I^2t： （$\times10^6A^2s$） Faulty current detection fuse:Φ0.8mm，L≥50mm test number:1 time Schematic number of short circuit point: Expected current oscillogram No. Test oscillogram No.	 425 50.8 0.23 2.84 Φ0.8mm，L=50mm 1 See short circuit diagram S202328006-Y S202359050	Pass Pass
	Functional unit short circuit tolerance strength verification（ #3-/） test voltage：$1.05\times/^{+5\%}$ V Test current (effective value):$/^{+5\%}$ kA cosφ： / I^2t： （$\times10^6A^2s$） Faulty current detection fuse:Φ0.8mm，L≥50mm test number:1 time Schematic number of short circuit point: Expected current oscillogram No. Test oscillogram No.		
	Functional unit short circuit tolerance strength verification（ #3-/） test voltage：$1.05\times/^{+5\%}$ V Test current (effective value):$/^{+5\%}$ kA cosφ： / I^2t： （$\times10^6A^2s$） Faulty current detection fuse:Φ0.8mm，L≥50mm test number:1 time Schematic number of short circuit point: Expected current oscillogram No. Test oscillogram No.		

Clause No.	Test itemsand requirements	Observed #1#2#3	Verdict
	testing result: a)After the test, if the electrical gap and creepage distance still conform to the provisions of 8.3, then the deformation of bus and conductor is acceptable. At this time, if there is any doubt about the electrical gap and creepage distance, measurement should be carried out; b)The insulation performance shall meet the requirements of the relevant equipment standards. The bus insulation parts, support parts, or cable fixers shall not be divided into two or more pieces, and no cracks shall occur on any surface of the support parts. c)The connecting parts of the wire should not be loose, and the wire should not fall off from the output terminal; d)The deformation of the busbar or structure of the complete set of equipment damages its normal use and should be regarded as failure; e)Any deformation of the busbar or structure of the complete set of equipment that damages the normal insertion or removal of removable components shall be regarded as failure; f)Deformation of shell or internal bulkhead, baffle and barrier due to short circuit is allowed, provided that there is no significant weakening of its protection class and the electrical clearance or creepage distance is not reduced below the value specified in 8.3; g)The melt to detect the fault current should not be fused; If in doubt, check whether the components packed into the complete set of equipment conform to the relevant specifications.	Compliance	
	Verification of short circuit strength of protective conductor（ master switch ） test voltage：$1.05\times230^{+5\%}$ V Test current (effective value):$48.0^{+5\%}$kA cosφ： $0.25_{-0.05}$ I2t：（$\times10^6A^2s$） Schematic number of short circuit point: Expected current oscillogram No. Test oscillogram No.	 245 48.6 0.23 86.5 See short circuit diagram S202328004-Y S202359051	Pass

Clause No.	Test itemsand requirements	Observed #1#2#3	Verdict
	Verification of short circuit strength of protective conductor(#02-C1） test voltage：1.05×230$^{+5\%}$ V Test current (effective value):30$^{+5\%}$ kA cosφ： 0.25 $_{-0.05}$ I^2t： （×10^6A^2s） Schematic number of short circuit point: Expected current oscillogram No. Test oscillogram No.	245 30.6 0.23 26.4 See short circuit diagram S202328558-Y S202359052	Pass
	Verification of short circuit strength of protective conductor(#03-C1） test voltage：1.05×230$^{+5\%}$ V Test current (effective value):30$^{+5\%}$ kA cosφ： 0.25 $_{-0.05}$ I^2t： （×10^6A^2s） Schematic number of short circuit point: Expected current oscillogram No. Test oscillogram No.	245 30.6 0.23 0.228 See short circuit diagram S202328558-Y S202359053	Pass
	Verification of short circuit strength of protective conductor(#03-C5） test voltage：1.05×230$^{+5\%}$ V Test current (effective value):30$^{+5\%}$ kA cosφ： 0.25 $_{-0.05}$ I^2t： （×10^6A^2s） Schematic number of short circuit point: Expected current oscillogram No. Test oscillogram No.	245 30.6 0.23 0.322 See short circuit diagram S202328558-Y S202359054	Pass
	Verification of short circuit strength of protective conductor(#03-C7） test voltage：1.05×230$^{+5\%}$ V Test current (effective value):30$^{+5\%}$ kA cosφ： 0.25 $_{-0.05}$ I^2t： （×10^6A^2s） Schematic number of short circuit point: Expected current oscillogram No. Test oscillogram No.	245 30.6 0.23 0.561 See short circuit diagram S202328558-Y S202359055	Pass

Clause No.	Test itemsand requirements	Observed #1#2#3	Verdict
	Verification of short circuit strength of protective conductor(#03-/） test voltage：1.05×/$^{+5\%}$ V Test current (effective value):/$^{+5\%}$ kA cosφ：/ I^2t：（×10^6A^2s） Schematic number of short circuit point: Expected current oscillogram No. Test oscillogram No.		Pass
	Verification of short circuit strength of protective conductor(#03-/） test voltage：1.05×/$^{+5\%}$ V Test current (effective value):/$^{+5\%}$ kA cosφ：/ I^2t：（×10^6A^2s） Schematic number of short circuit point: Expected current oscillogram No. Test oscillogram No.		
	Test result a)The continuity of the protective conductor shall not be destroyed; b)Deformation of the housing or internal partition, baffle, and barrier due to a short circuit is permitted, and the electrical clearance or creepage distance is not reduced below the value specified in Standard 8.3, as long as the protection level is not significantly weakened.	Compliance	
	Dielectric strength test after short circuit tolerance strength nominal insulation voltage; Ambient temperature ; Humidity; Atmospheric pressure ; testing voltage; Pressure time; Pressure parts; A) Between all live parts and the frame of the assembly; B)Between each pole and all other poles connected to the frame of the assembly.	400V 15℃ 51% 1002hpa 1000V 60s	

Clause No.	Test itemsand requirements	Observed #1#2#3	Verdict
10.12	Electromagnetic Compatibility Electrostatic discharge immunity test Refer to IEC 61000-4-2:2008 for test methods Test conditions: Test voltage: ±8kV (air discharge) ±4kV (contact discharge or if contact discharge is not possible) Test times: 10 positive pulses, 10 negative pulses Interval: 1s Acceptance criteria: B 1) General performance: temporary reduction or loss of self-recovery performance 2) Operation of power circuits and auxiliary circuits: the performance of self-recovery is temporarily reduced or lost 3) Display and control board operation: temporary visual changes or information loss, LED abnormal light 4) Information processing and detection functions: temporary communication failures may cause internal and external equipment errors	/	N

Clause No.	Test itemsand requirements	Observed #1#2#3	Verdict
	Electrical fast transient/pulse group immunity test Test method refer to GB/T 17626.4-2018 Test conditions: （1）Test port: Power port Test voltage：±2kV（Class A environment） ±1kV（Class B environment） Repetition rate：5kHz Application time：1min （2）Test port: Signal port Test voltage：±1kV（Class A environment） ±0.5kV（Class B environment） Repetition rate：5kHz Application time：1min Acceptance criteria: B 1）General performance: Temporary reduction or loss of self-recovering performance 2）Operation of power and auxiliary circuits: temporary reduction or loss of self-recovering performance 3）Display and control board operation: temporary visual changes or information loss, LED abnormal light 4）Information processing and detection functions: Temporary communication failures that can cause internal and external device errors	/	N
	1.2/50s and 8/20s surge immunity tests Test method refer to IEC 61000-4-5:2014+A1:2017 Test conditions: Test voltage： 1）Power port (wire-to-ground)±2kV； 2）Power port (wire-to-wire)±1kV （Applicable only to Class A environments） 3）Signal port（wire-to-ground）±1kV Test times: 5 positive pulses, 5 negative pulses Test phase：0°、90°、180°、270° Interval time：1min Acceptance criteria: B 1）General performance: Temporary reduction or loss of self-recovering performance 2）Operation of power and auxiliary circuits: temporary reduction or loss of self-recovering performance 3）Display and control board operation: temporary visual changes or information loss, LED abnormal light 4）Information processing and detection functions: Temporary communication failures that can cause internal and external device errors	/	N

Figure :Test points of temperature-rising

Rated dispersion factor1.0

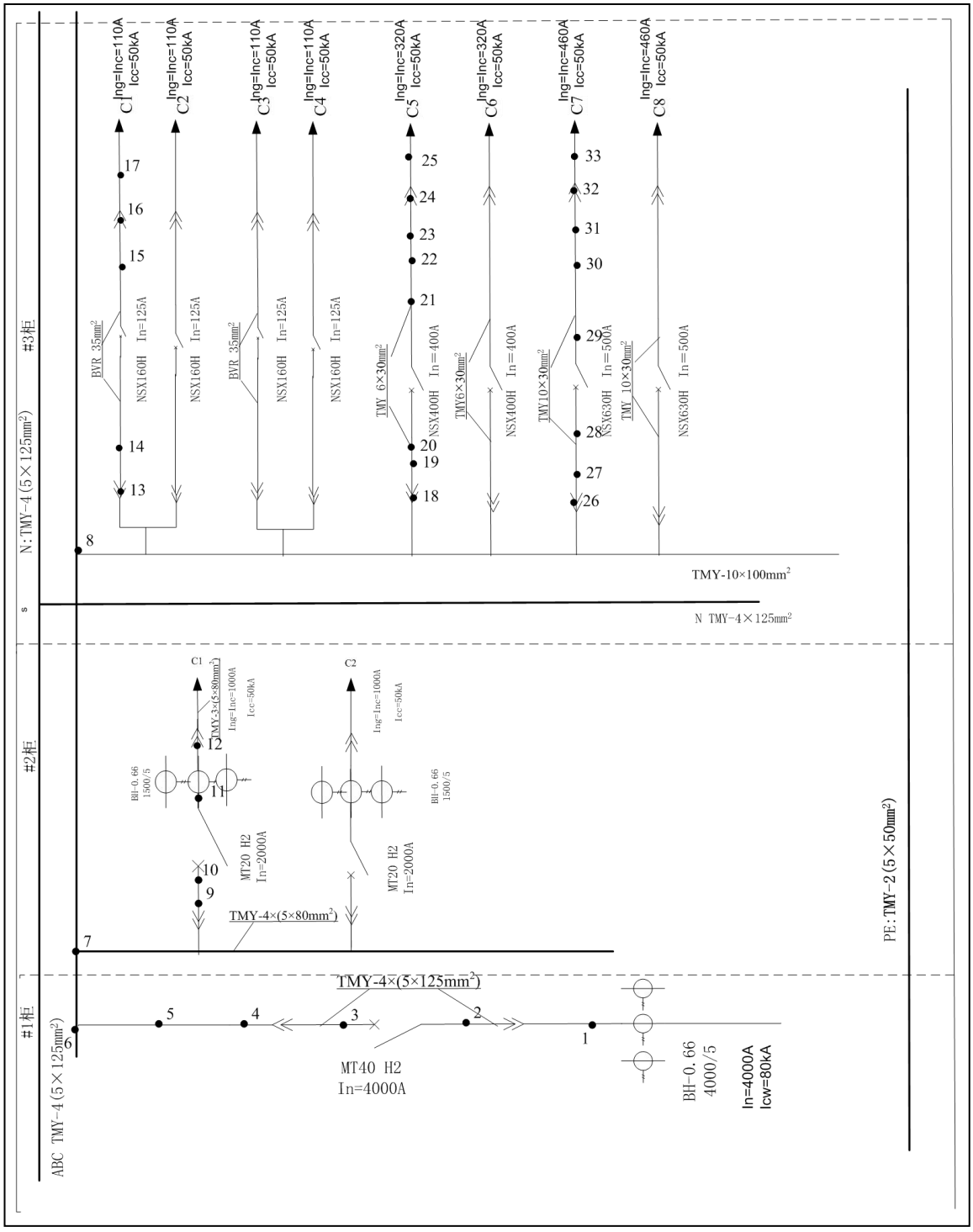
	#1	#2 RDF:1.0				#3 RFD:1.0 (In=2000A)									
phase	main circuit	C1	C2			C1	C2	C3	C4	C5	C6	C7	C8		
A	4000	1000	1000			110	110	110	110	320	320	460	460		
B	4000	1000	1000			110	110	110	110	320	320	460	460		
C	4000	1000	1000			110	110	110	110	320	320	460	460		

Rated dispersion factor1.0

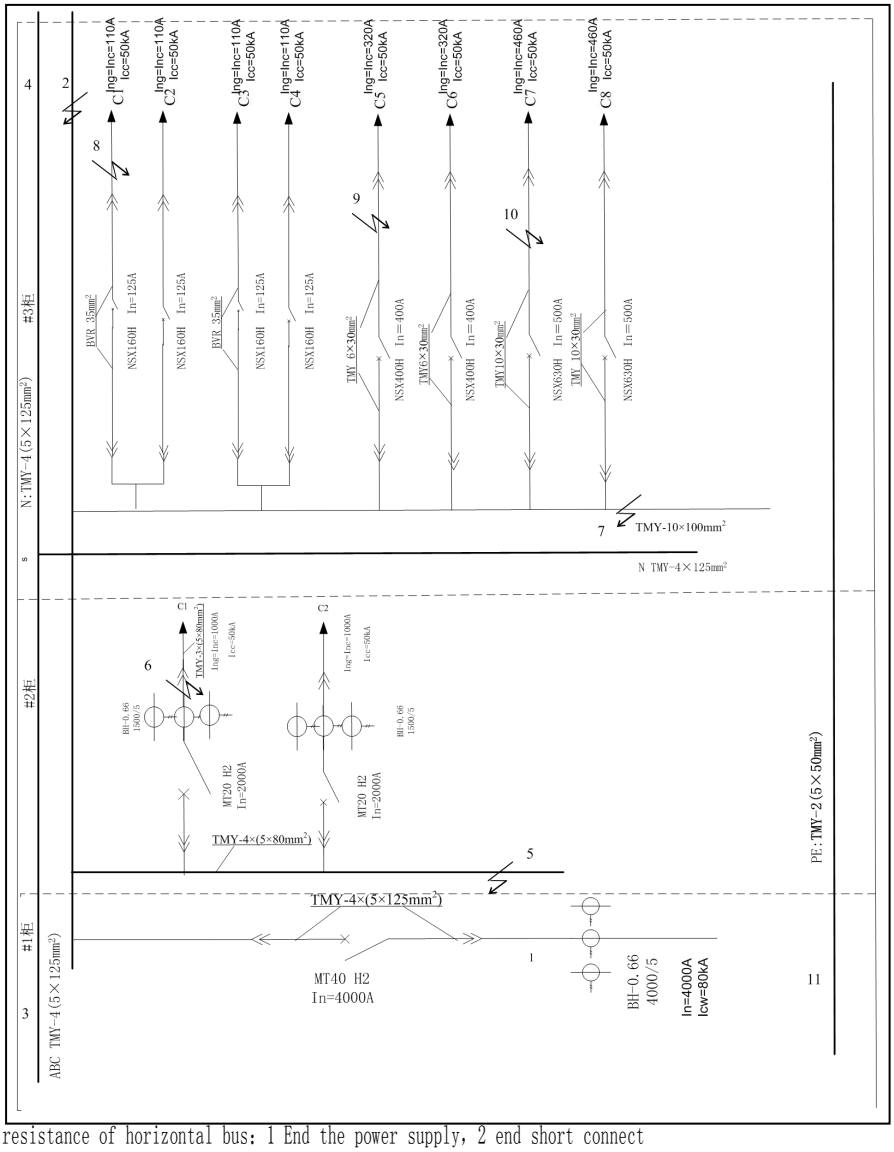
（measured value）

phase	main circuit	C1	C2			C1	C2	C3	C4	C5	C6	C7	C8		
A	4011	1004	1008			111	114	111	111	324	321	465	464		
B	4007	1009	1003			112	111	111	112	322	322	464	464		
C	4015	1007	1004			112	112	112	113	323	322	461	463		
average value	4011	1007	1005			112	112	111	112	323	322	463	464		

Schematic diagram of temperature rise, short-circuit point and temperature rise parameter table:



Short circuit test input line and short circuit point table:



Rated short-time current resistance of horizontal bus: 1 End the power supply, 2 end short connect

#2 cabinet vertical bus rated short-term current tolerance: 1 End the power supply, 5 end short connect

#3 cabinet vertical bus rated short-term current resistance: 1 End the power supply, 7 end short connect

N Rated short-time current tolerance of bus bars and adjacent phase lines: 1, 3 End the power supply, 2,4 end short connect

Short-time breaking ability test of switch:

#1-Master switch: 1 End the power supply, 2 end short connect

#2-C1: 1 End the power supply, 6 end short connect #3-C1: 1 End the power supply, 8 end short connect

#3-C5: 1 End the power supply, 9 end short connect #3-C7: 1 End the power supply, 10 end short connect

Short-circuit strength test of switches and protective conductors:

#1: 1 End phase A of the power supply, 11 Connect the terminal to phase N of the power supply, The corresponding outgoing terminal 2 is short-circuited with the adjacent terminal of the protection conductor

#2-C1: 1 End phase A of the power supply, 11 Connect the terminal to phase N of the power supply, The corresponding outgoing terminal 6 is short-circuited with the adjacent terminal of the protection conductor

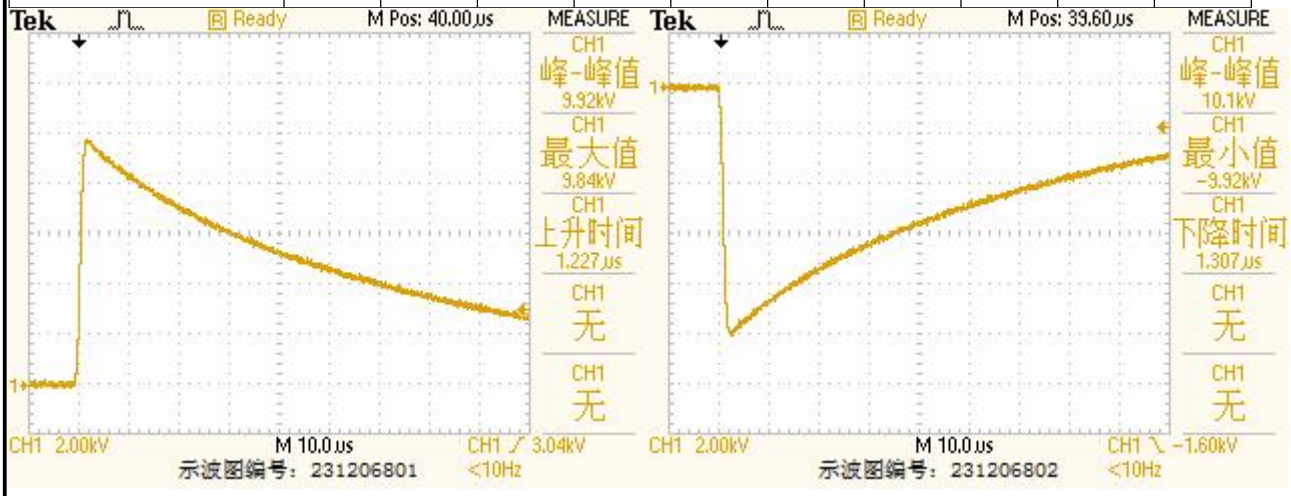
#3-C1: 1 End phase A of the power supply, 11 Connect the terminal to phase N of the power supply, The corresponding outgoing terminal 8 is short-circuited with the adjacent terminal of the protection conductor

#3-C5: 1 End phase A of the power supply, 11 Connect the terminal to phase N of the power supply, The corresponding outgoing terminal 9 is short-circuited with the adjacent terminal of the protection conductor

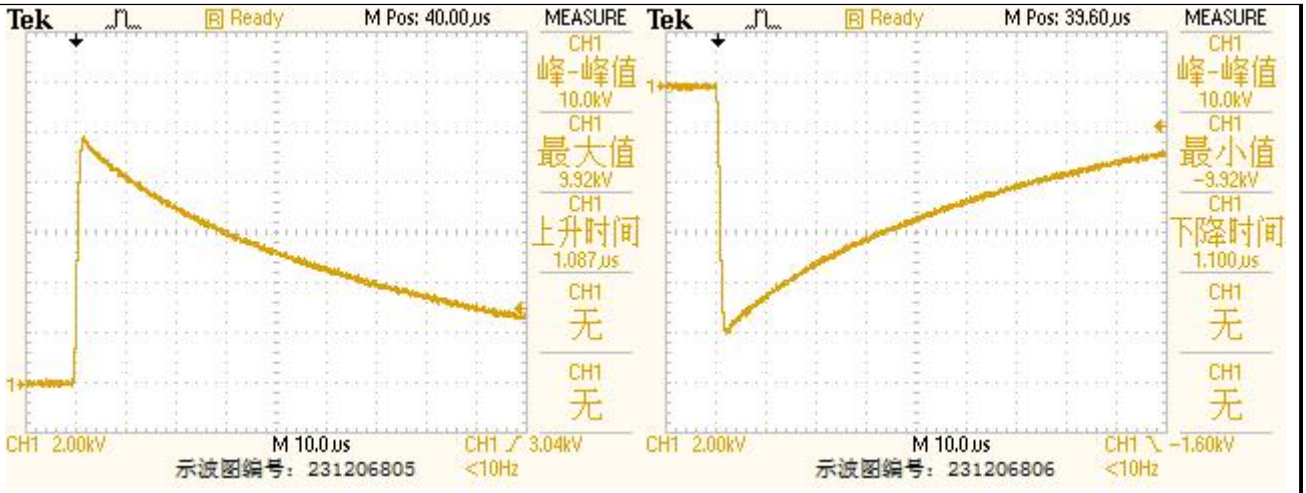
#3-C7: 1 End phase A of the power supply, 11 Connect the terminal to phase N of the power supply, The corresponding outgoing terminal 10 is short-circuited with the adjacent terminal of the protection conductor

Oscillograph

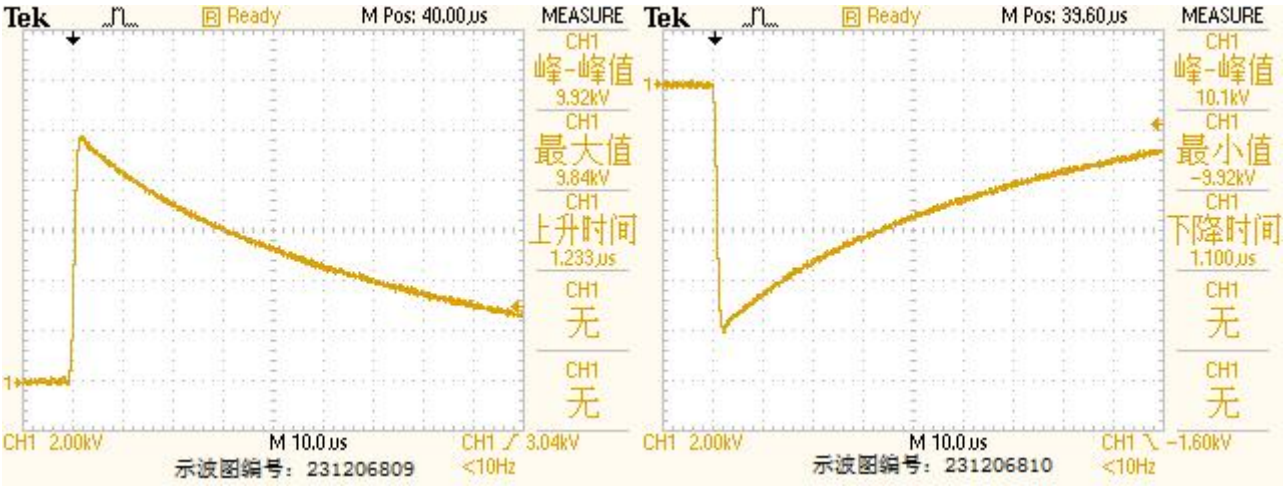
Test site	positive polarity					negative going				
a) Between all live parts and exposed conductive parts connected to each other										
（A、B、C、N—frame）	9.92	10.0	10.0	9.80	9.84	9.80	10.0	9.92	9.84	9.88
b) Between each pole and all other poles on the exposed conductive part to which it is attached										
（A—B、C、N、frame）	10.0	9.80	9.92	9.92	9.88	9.92	9.80	10.0	9.84	9.92
（B—A、C、N、frame）	9.84	9.92	10.0	9.88	9.80	9.84	9.92	9.92	9.80	10.0
（C—A、B、N、frame）	9.88	9.80	10.0	9.92	9.84	9.92	10.0	9.92	9.80	9.88
（N—A、B、C、frame）	9.92	10.0	9.84	9.80	9.88	9.92	9.80	10.0	9.84	9.92

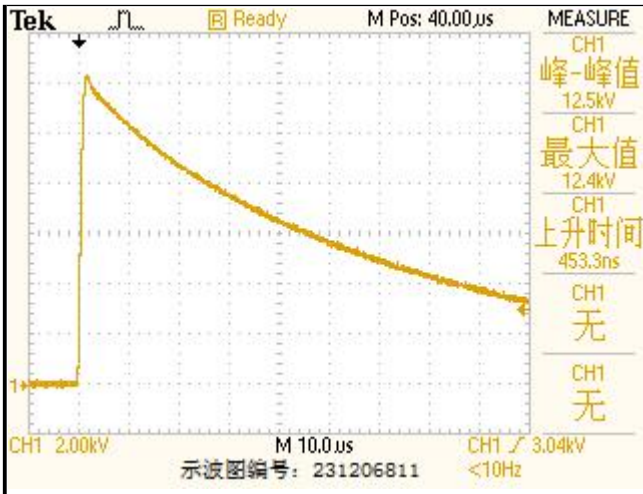




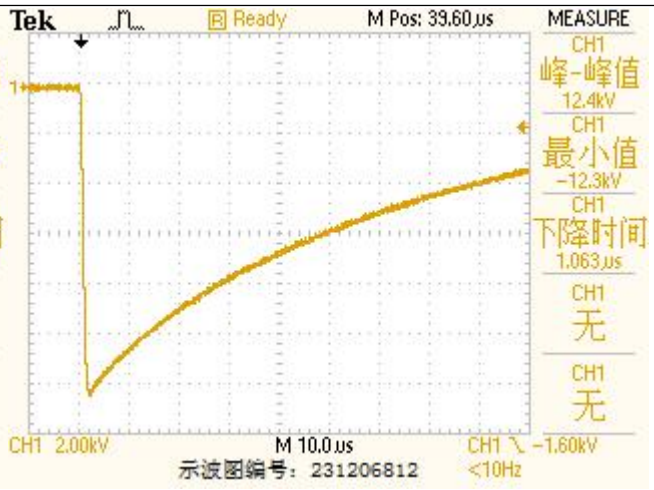

Tek
Ready
M Pos: 40.00µs
MEASURE
CH1
峰-峰值
10.0kV
CH1
最大值
9.92kV
CH1
上升时间
1.087µs
CH1
无
CH1
无
CH1 2.00kV
M 10.0µs
CH1 ⁄ 3.04kV
<10Hz
示波图编号：231206805
Tek
Ready
M Pos: 39.60µs
MEASURE
CH1
峰-峰值
10.0kV
CH1
最小值
-9.92kV
CH1
下降时间
1.100µs
CH1
无
CH1
无
CH1 2.00kV
M 10.0µs
CH1 ⁄ -1.60kV
<10Hz
示波图编号：231206806


Tek
Ready
M Pos: 40.00µs
MEASURE
CH1
峰-峰值
9.92kV
CH1
最大值
9.84kV
CH1
上升时间
1.240µs
CH1
无
CH1
无
CH1 2.00kV
M 10.0µs
CH1 ⁄ 3.04kV
<10Hz
示波图编号：231206807
Tek
Ready
M Pos: 39.60µs
MEASURE
CH1
峰-峰值
10.0kV
CH1
最小值
-9.84kV
CH1
下降时间
1.260µs
CH1
无
CH1
无
CH1 2.00kV
M 10.0µs
CH1 ⁄ -1.60kV
<10Hz
示波图编号：231206808

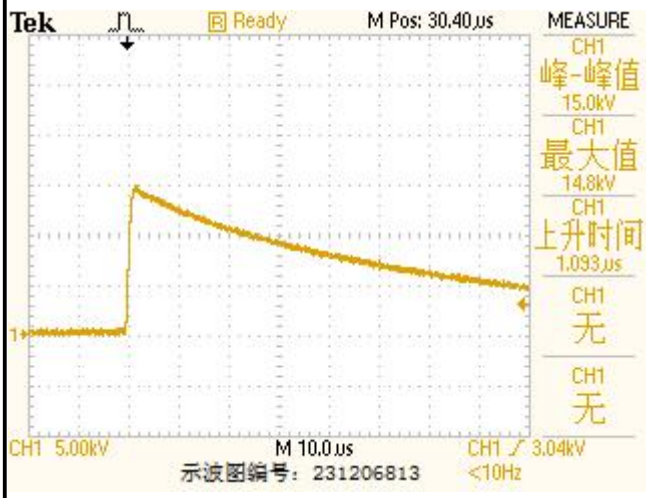

Tek
Ready
M Pos: 40.00µs
MEASURE
CH1
峰-峰值
9.92kV
CH1
最大值
9.84kV
CH1
上升时间
1.233µs
CH1
无
CH1
无
CH1 2.00kV
M 10.0µs
CH1 ⁄ 3.04kV
<10Hz
示波图编号：231206809
Tek
Ready
M Pos: 39.60µs
MEASURE
CH1
峰-峰值
10.1kV
CH1
最小值
-9.92kV
CH1
下降时间
1.100µs
CH1
无
CH1
无
CH1 2.00kV
M 10.0µs
CH1 ⁄ -1.60kV
<10Hz
示波图编号：231206810



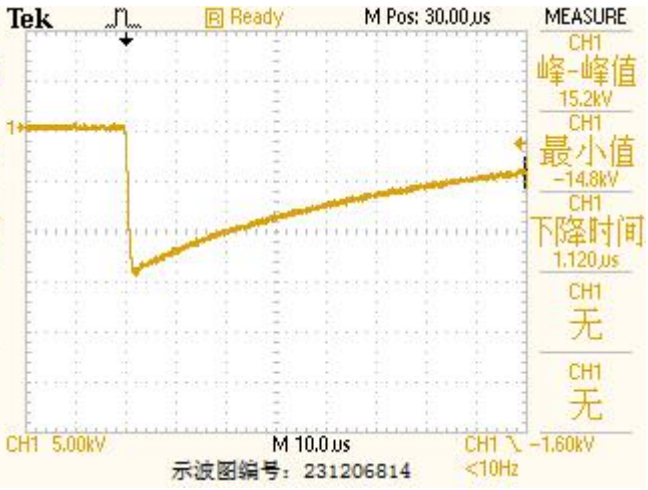
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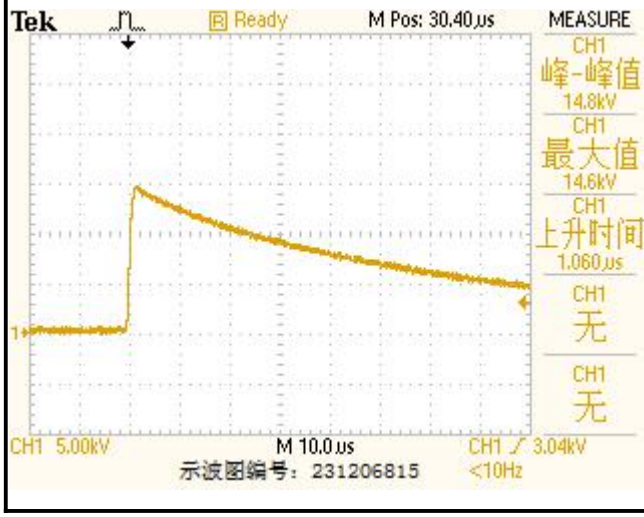
示波图编号：231206812



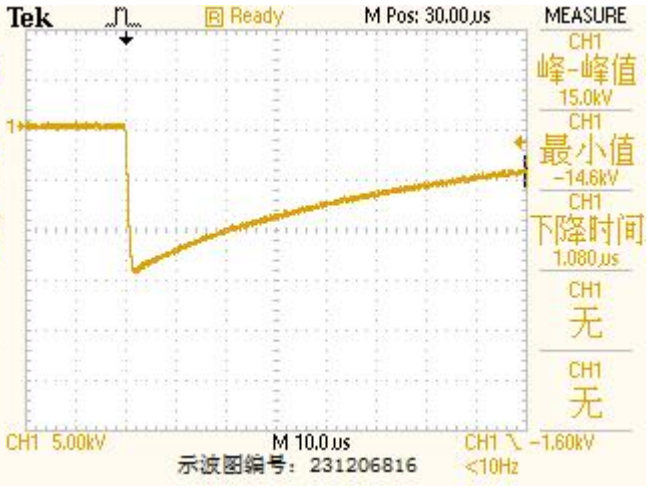
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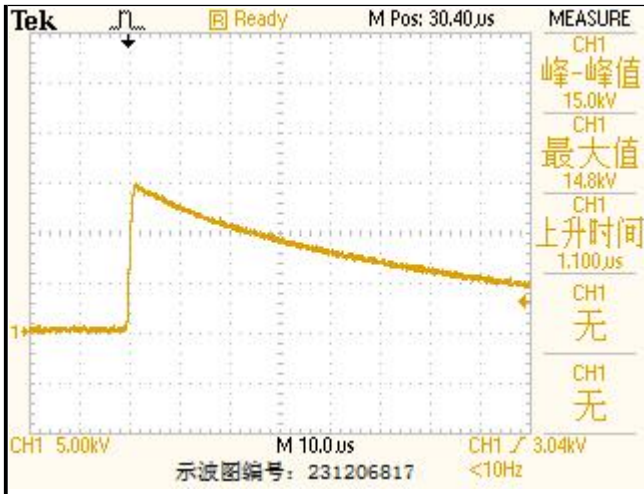
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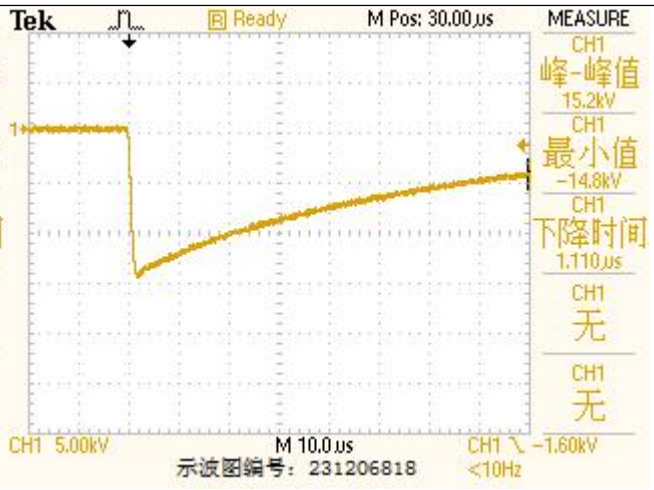
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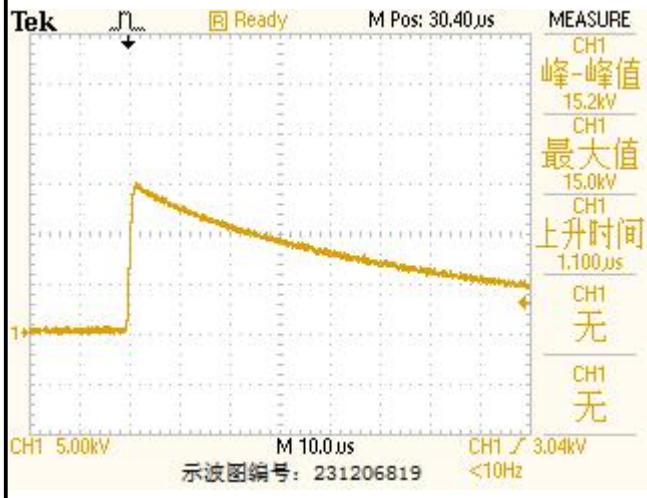
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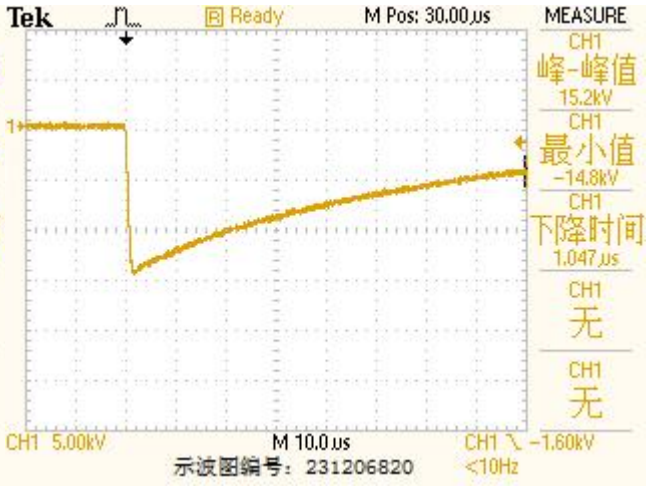
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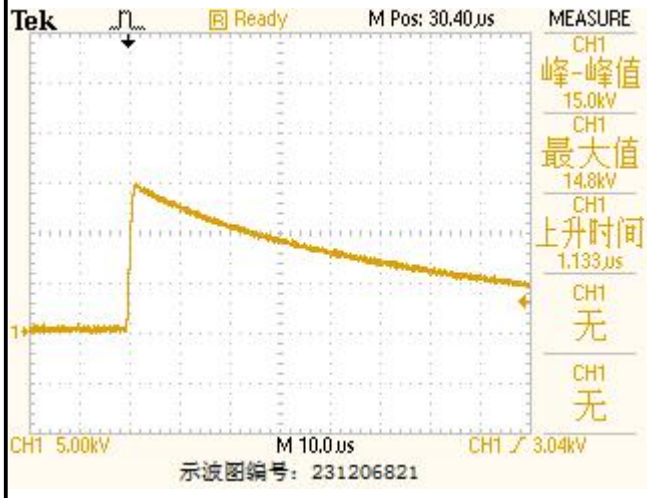
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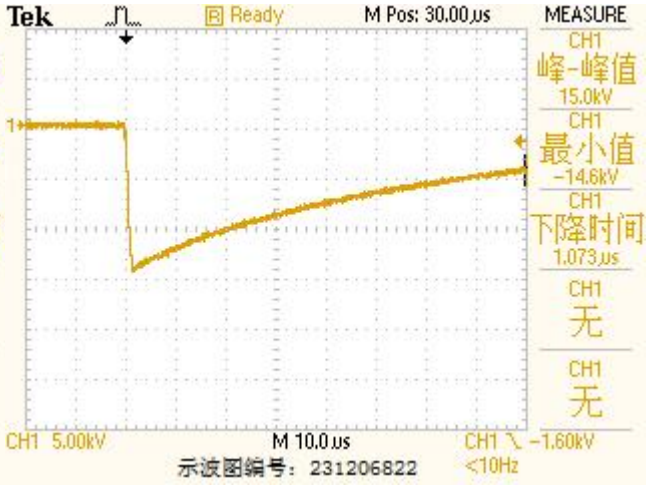
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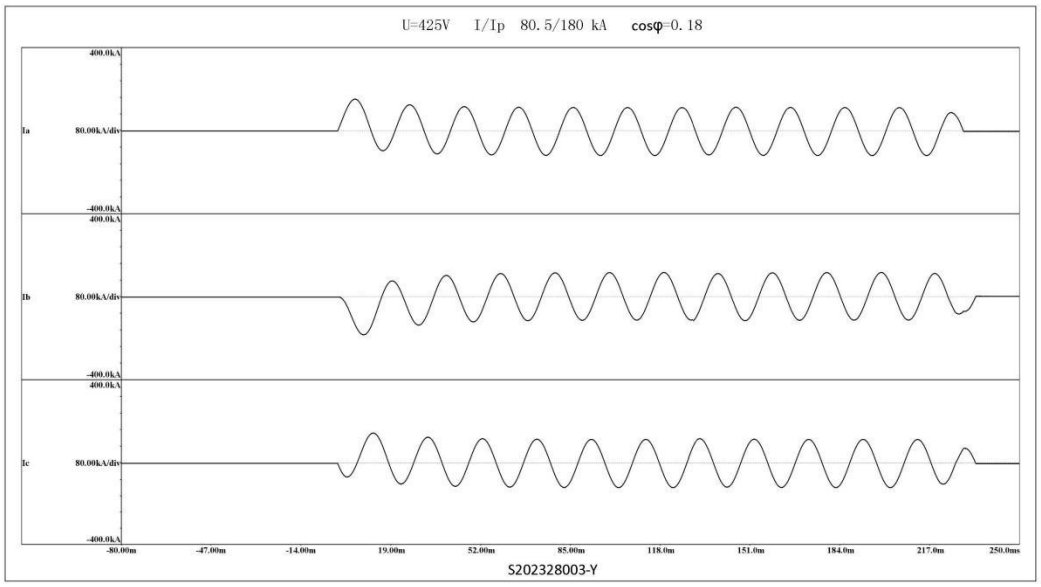


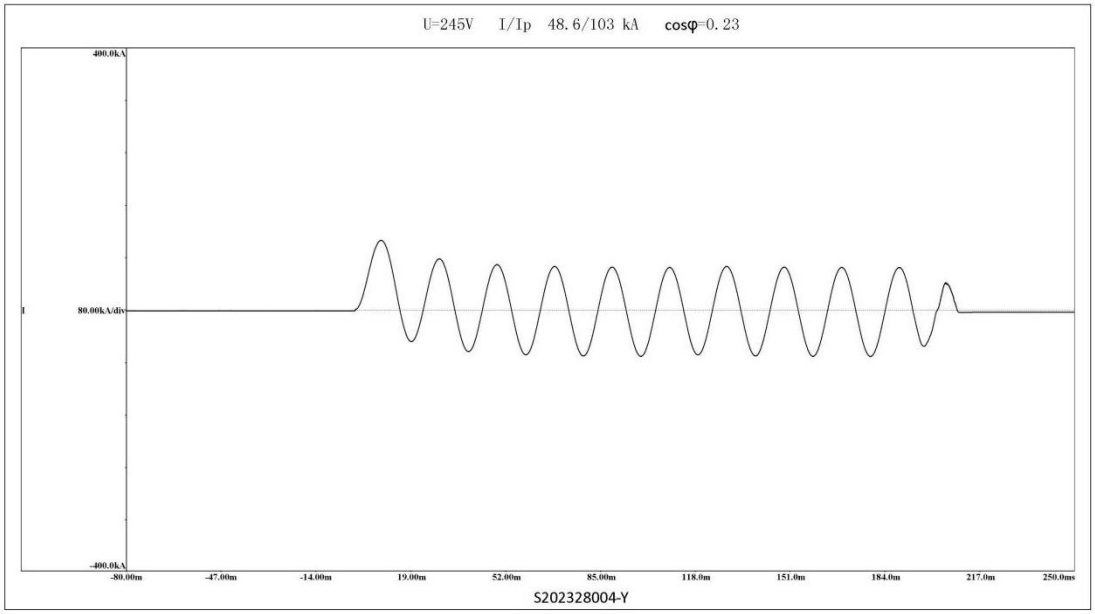
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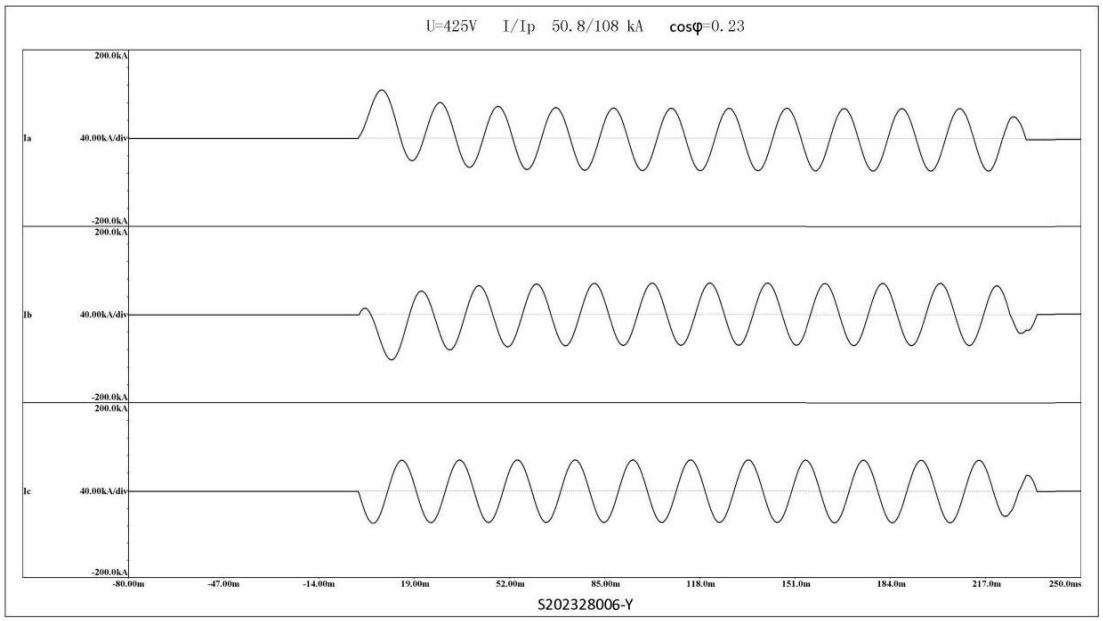


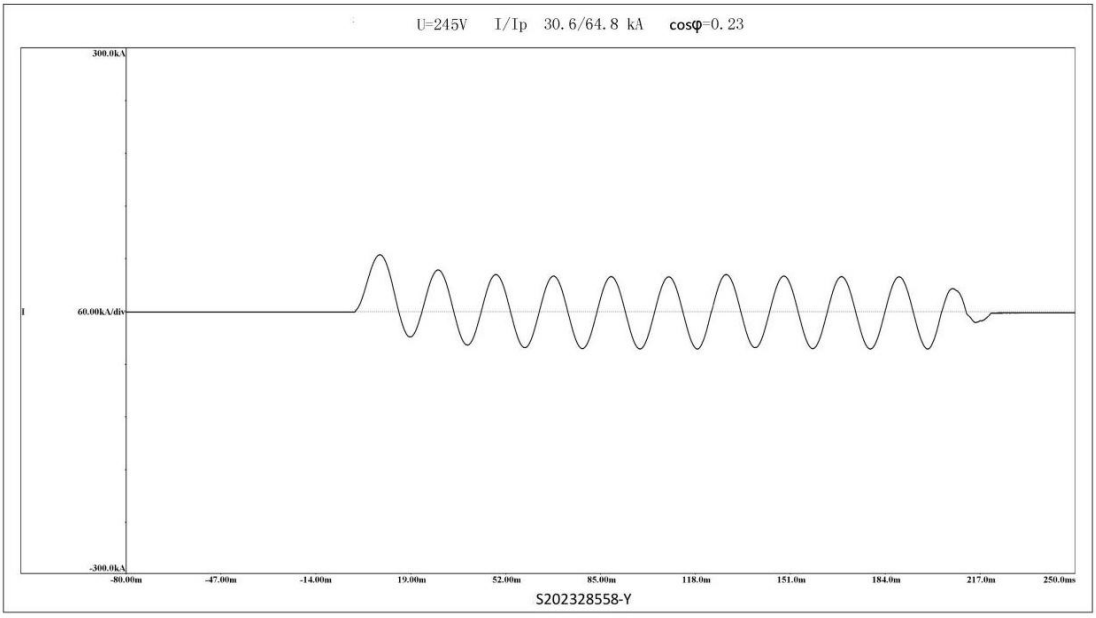
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oscillogram

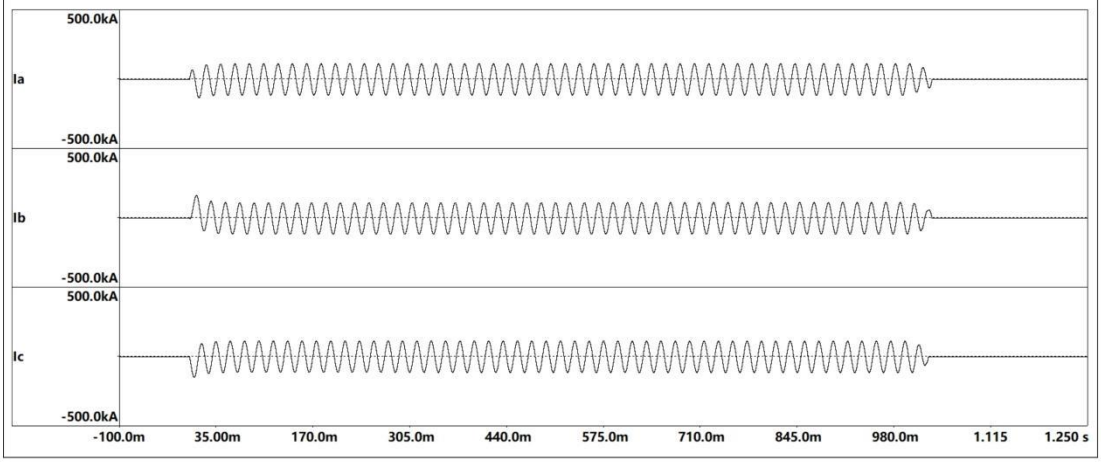




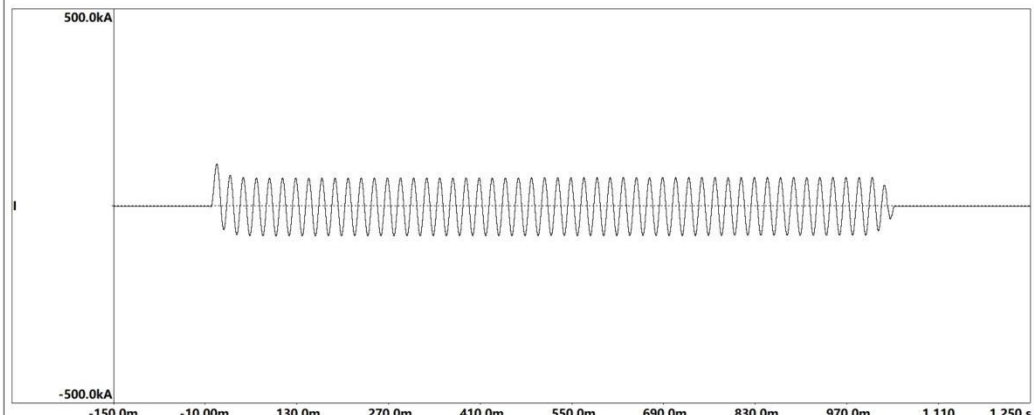

U=425V I/Ip 50.8/108 kA cosφ=0.23
Ia
Ib
Ic
200.0kA
40.00kA/div
-200.0kA
-80.00m
-47.00m
-14.00m
19.00m
52.00m
85.00m
118.0m
151.0m
184.0m
217.0m
250.0ms
S202328006-Y


U=245V I/Ip 30.6/64.8 kA cosφ=0.23
I
300.0kA
60.00kA/div
-300.0kA
-80.00m
-47.00m
-14.00m
19.00m
52.00m
85.00m
118.0m
151.0m
184.0m
217.0m
250.0ms
S202328558-Y

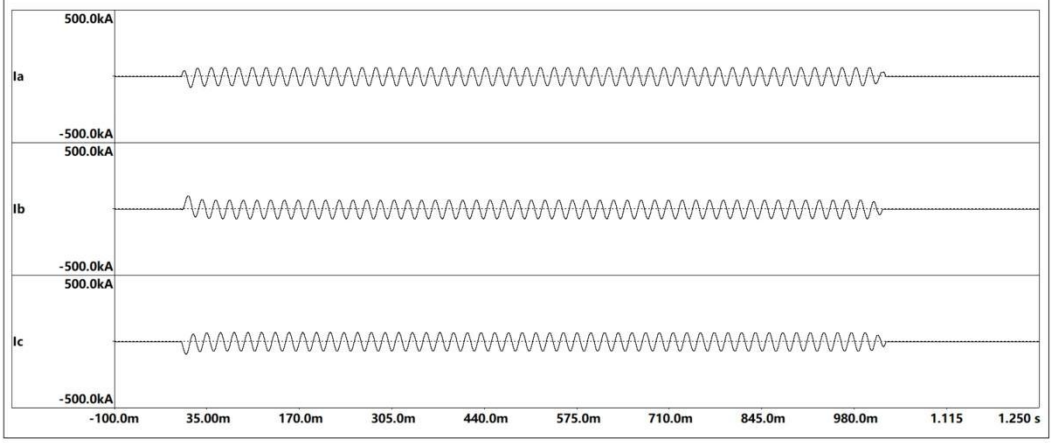
Rated Short-time/Penk Withstand Current(Horizontal Busbar)	03401-23-12068C-S	BlokSet 5000
U= 425V	I/Ip=80.5kA/180kA	cosφ= 0.18
#1#2#3	T= 1.03 s	IIT= 6.632GA²s
S202359042		



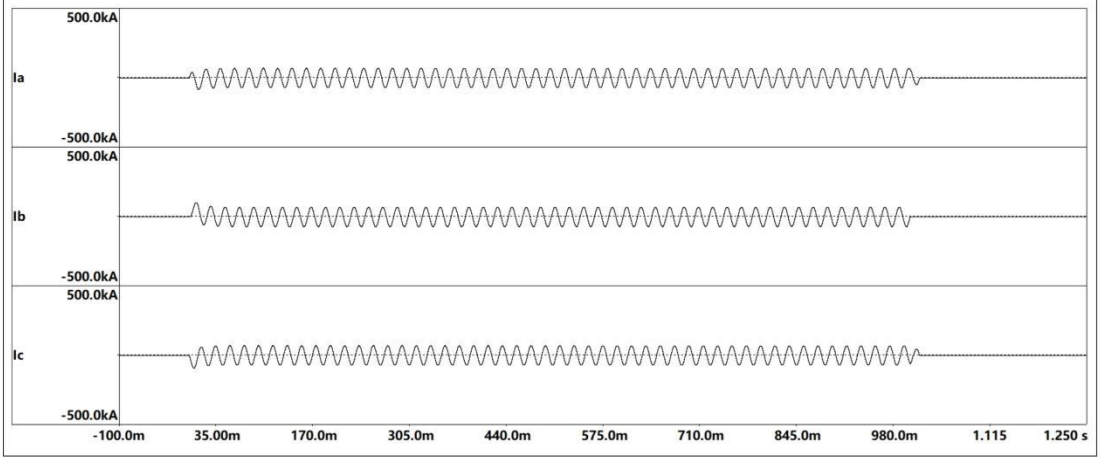
Rated Short-time/Penk Withstand Current(N-C Busbar)	03401-23-12068C-S	BlokSet 5000
U= 245V	I/Ip= 48.6kA/103kA	cosφ= 0.23
#1#2#3	T= 1.04 s	IIT= 2.458GA²s
S202359043		



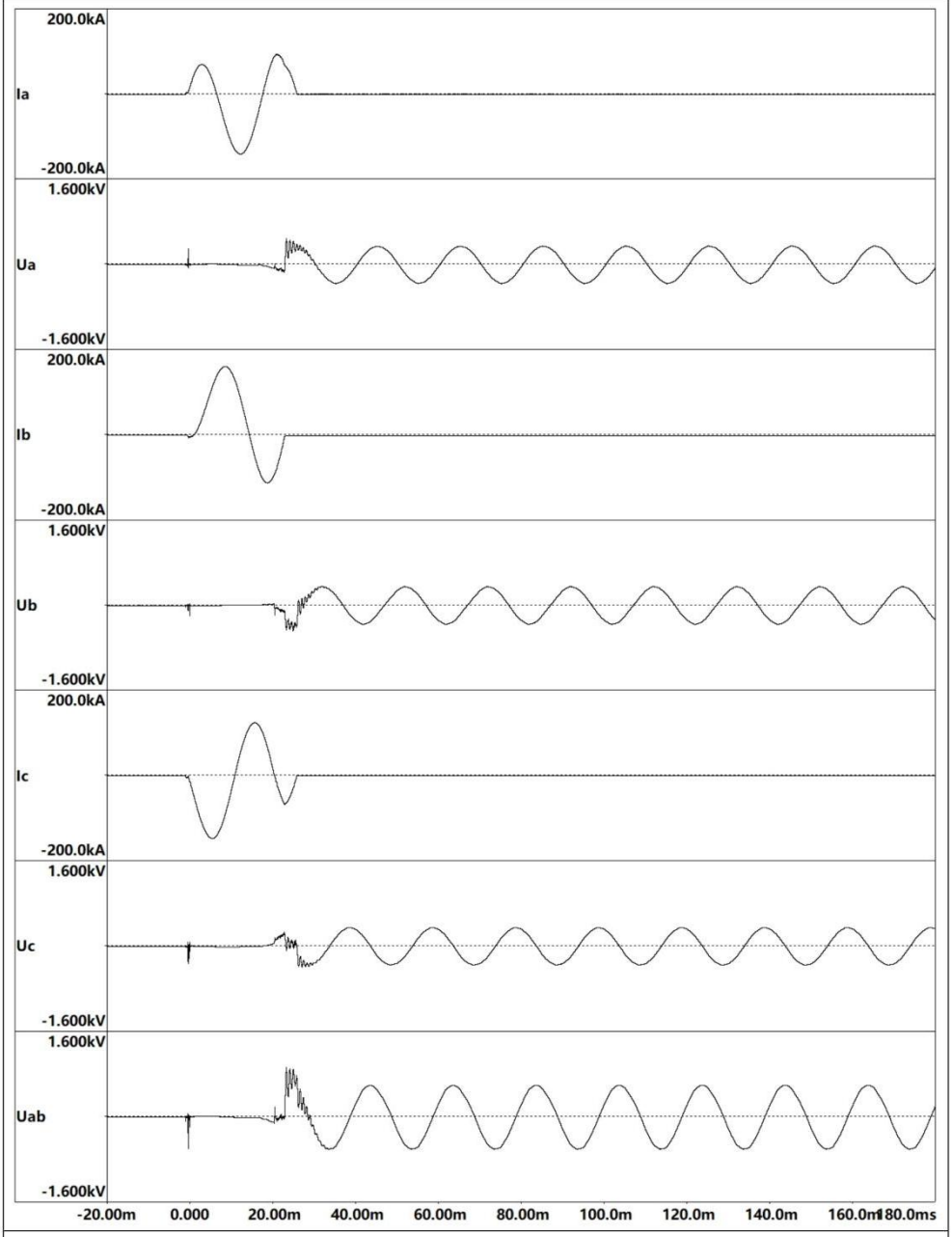
Rated Short-Time/Penk Withstand Current(#2 Vertical Busbar) | 03401-23-12068C-S | BlokSet 5000
U= 425V | I/Ip= 50.8kA/108kA | cosφ= 0.23
#1#2#3 | T= 1.03 s | IIT= 2.543GA²s
S202359044



Rated Short-Time/Penk Withstand Current(#3 Vertical Busbar) | 03401-23-12068C-S | BlokSet 5000
U= 425V | I/Ip= 50.8kA/108kA | cosφ= 0.23
#1#2#3 | T= 1.02 s | IIT= 2.531GA²s
S202359045

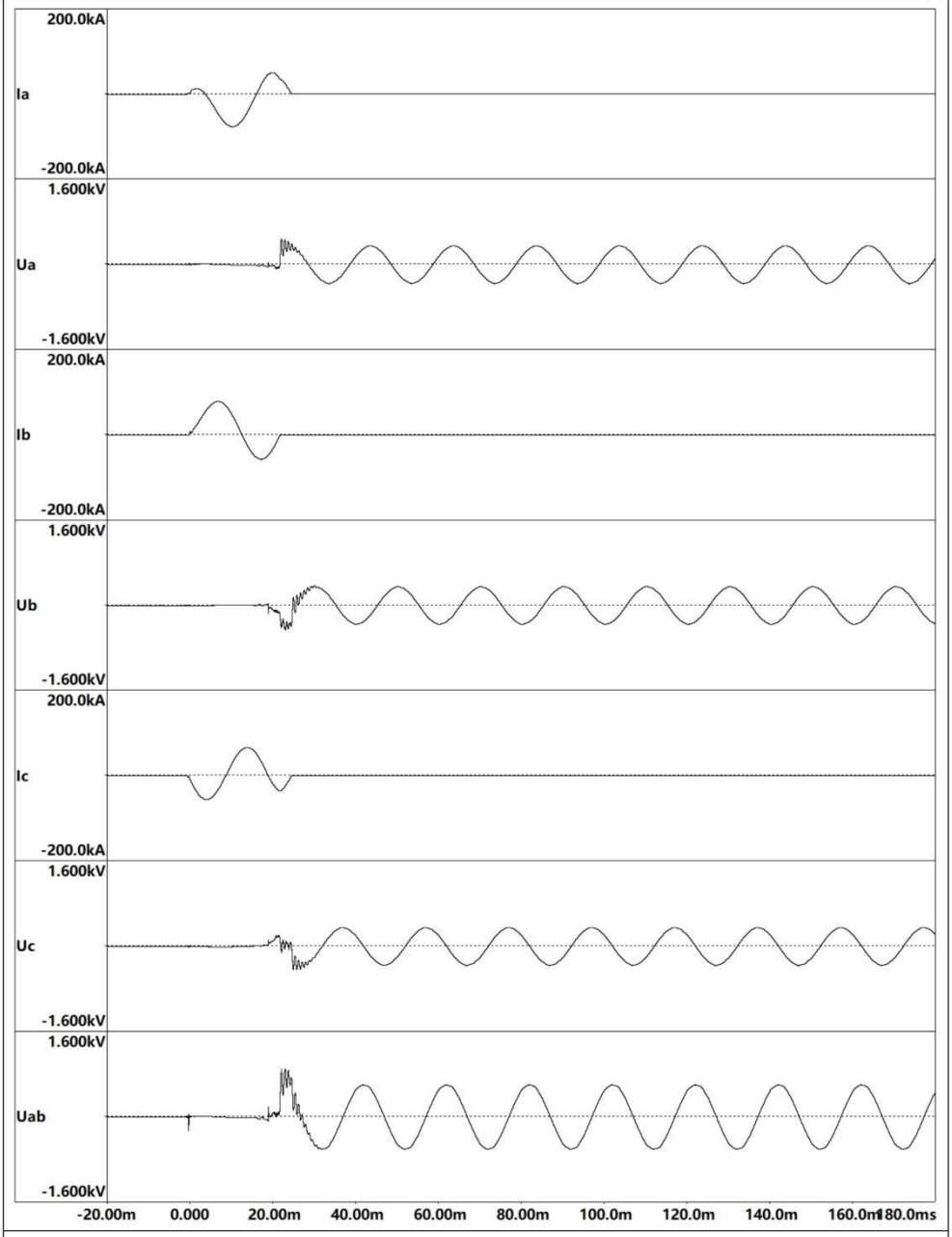


Short-Circuit Breaking Capacity(#1)	03401-23-12068C-S	S202359046
3Phase	BlokSet 5000	#1#2#3
U= 425V	I/Ip= 80.5kA/180kA	cosφ= 0.18



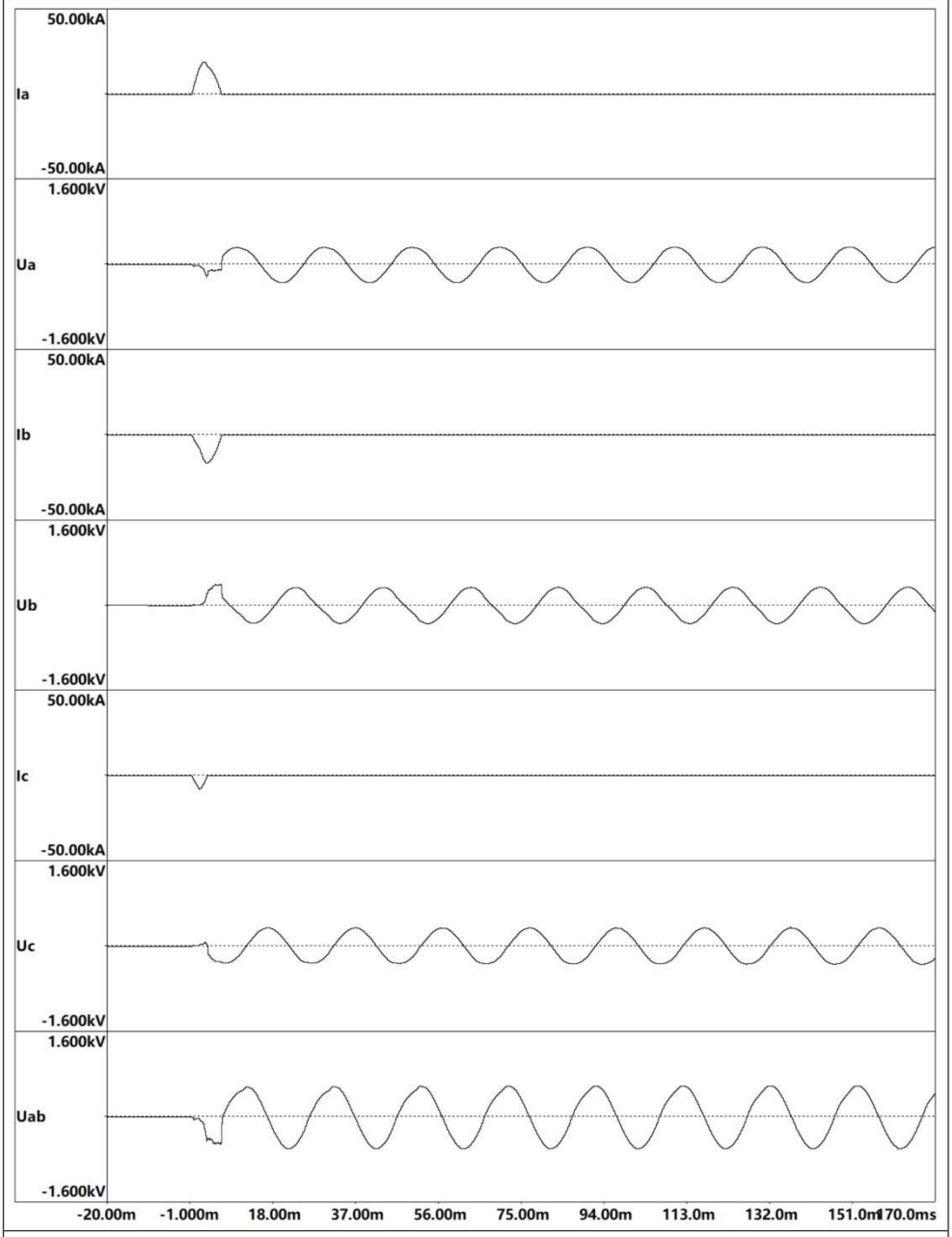
T= 27.0ms	Ta=2.62ms	Ip= 162kA
IIT_A= 160MA²S	IIT_B= 210MA²S	IIT_C= 204MA²S

Short-Circuit Breaking Capacity(#2C1)	03401-23-12068C-S	S202359047
3Phase	BlokSet 5000	#1#2#3
U= 425V	I/Ip= 50.8kA/108kA	cosφ= 0.23



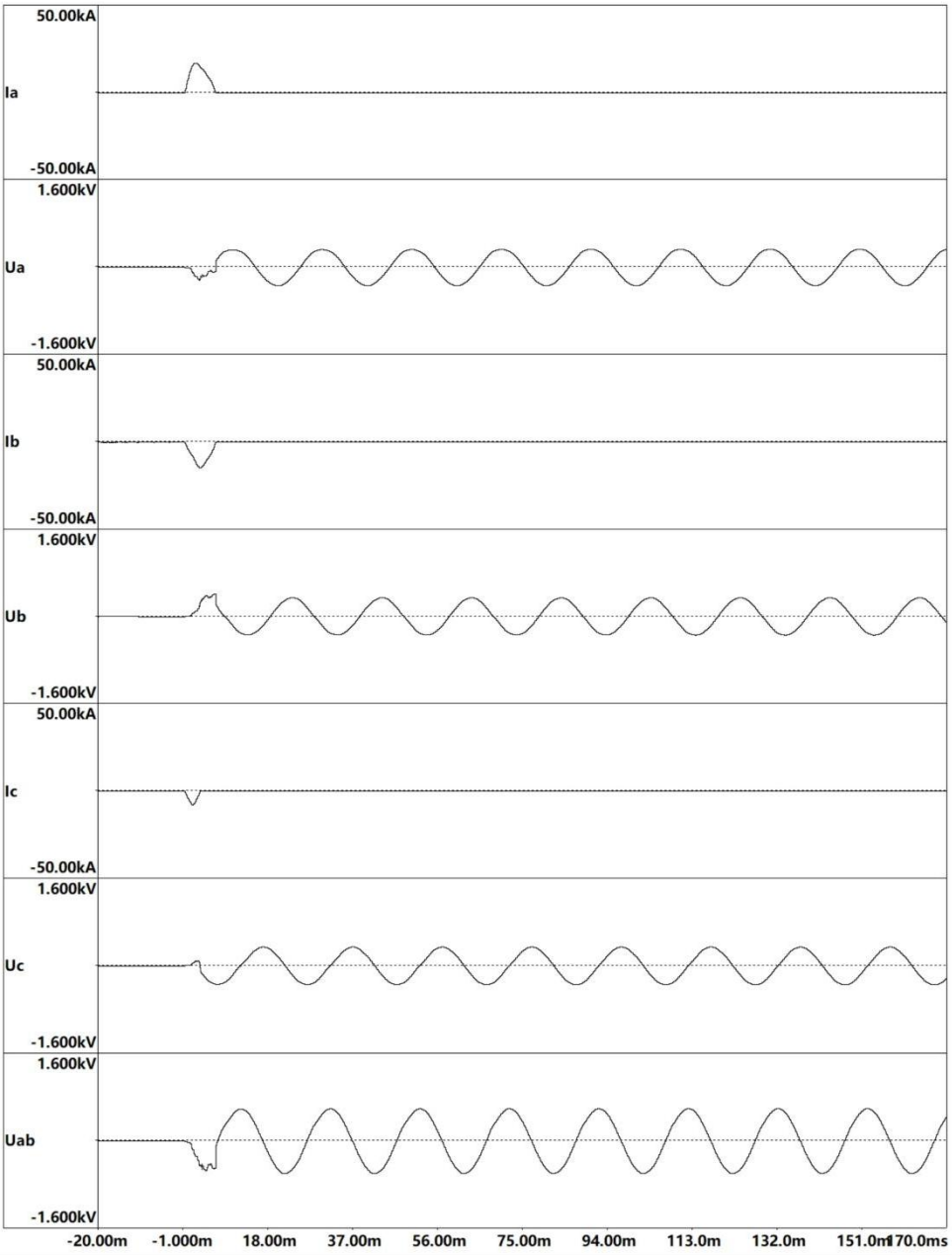
T= 25.4ms	Ta=2.36ms	Ip= 79.0kA
IIT_A= 44.7MA²s	IIT_B= 51.8MA²s	IIT_C= 39.7MA²s

Short-CircuitBreaking Capacity(#3C1)	03401-23-12068C-S	S202359048
3Phase	BlokSet 5000	#1#2#3
U= 425V	I/Ip= 50.8kA/108kA	cosφ= 0.23



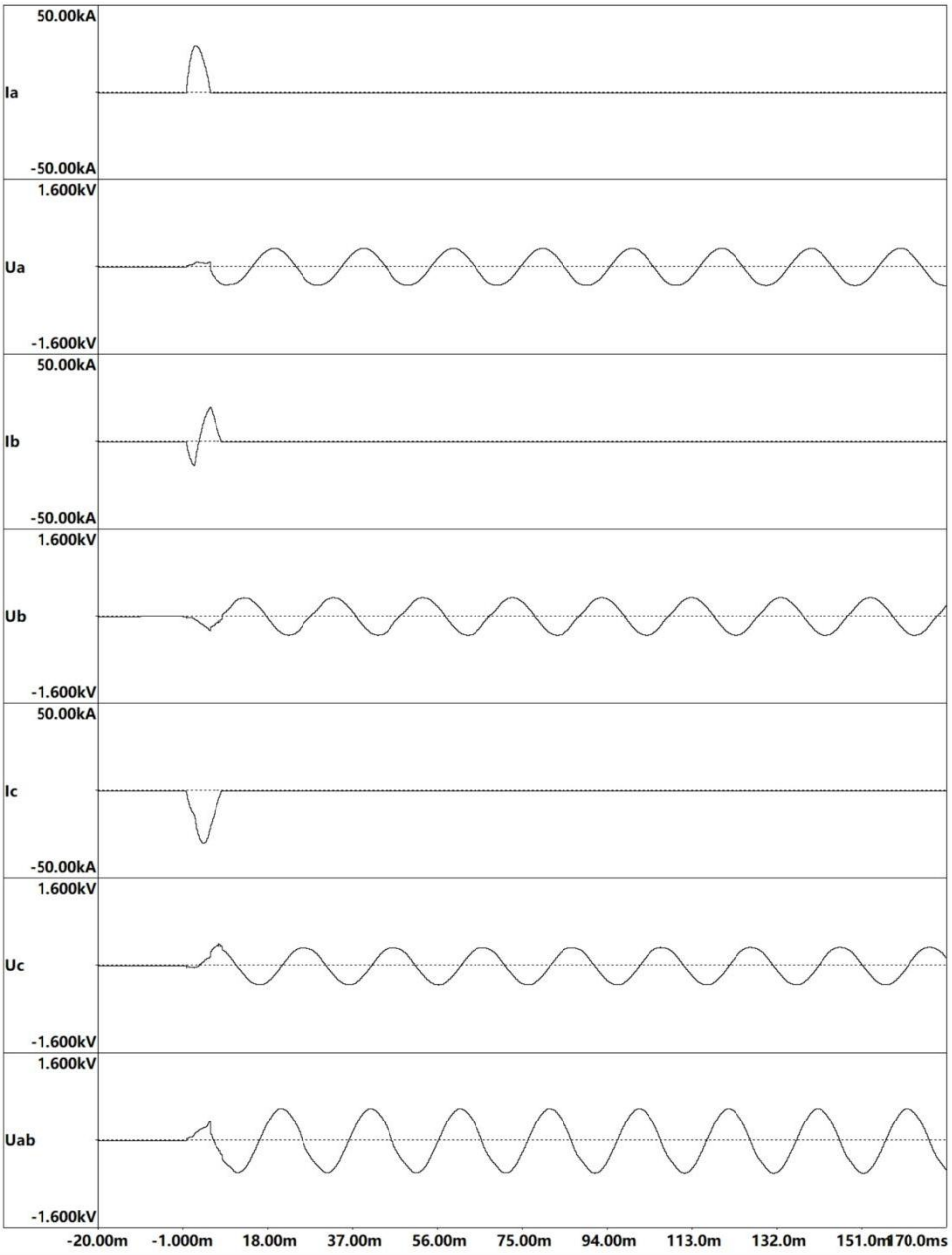
T= 6.83ms	Ta=2.56ms	Ip= 19.1kA
IIT_A= 1.13MA²s	IIT_B= 786kA²s	IIT_C= 92.8kA²s

Short-Circuit Breaking Capacity(#3C5)	03401-23-12068C-S	S202359049
3Phase	BlokSet 5000	#1#2#3
U= 425V	I/Ip= 50.8kA/108kA	cosφ= 0.23



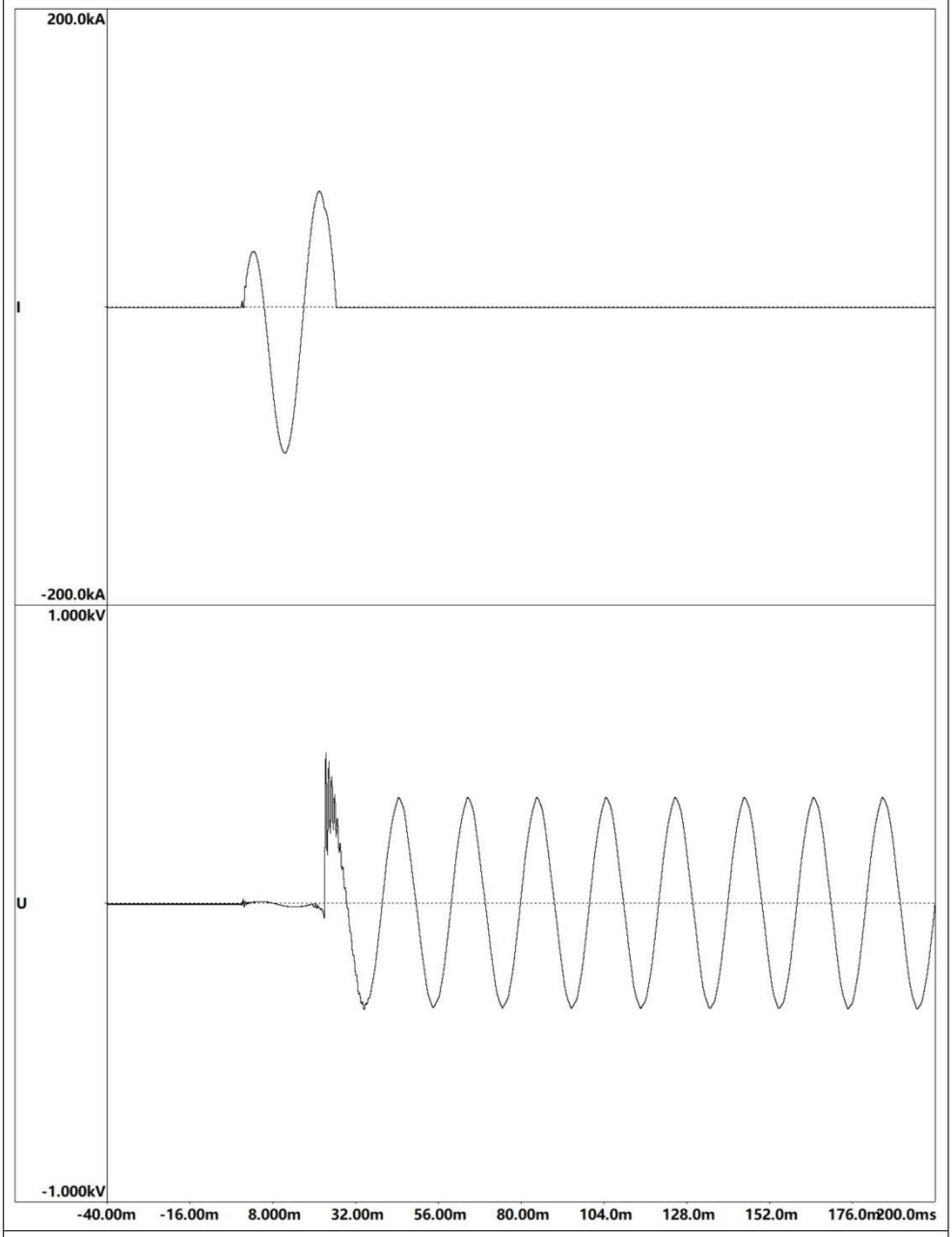
T= 6.92ms	Ta=2.06ms	Ip= 17.1kA
IIT_A= 940kA²s	IIT_B= 637kA²s	IIT_C= 94.9kA²s

Short-Circuit Breaking Capacity(#3C7)	03401-23-12068C-S	S202359050
3Phase	BlokSet 5000	#1#2#3
U= 425V	I/Ip= 50.8kA/108kA	cosφ= 0.23



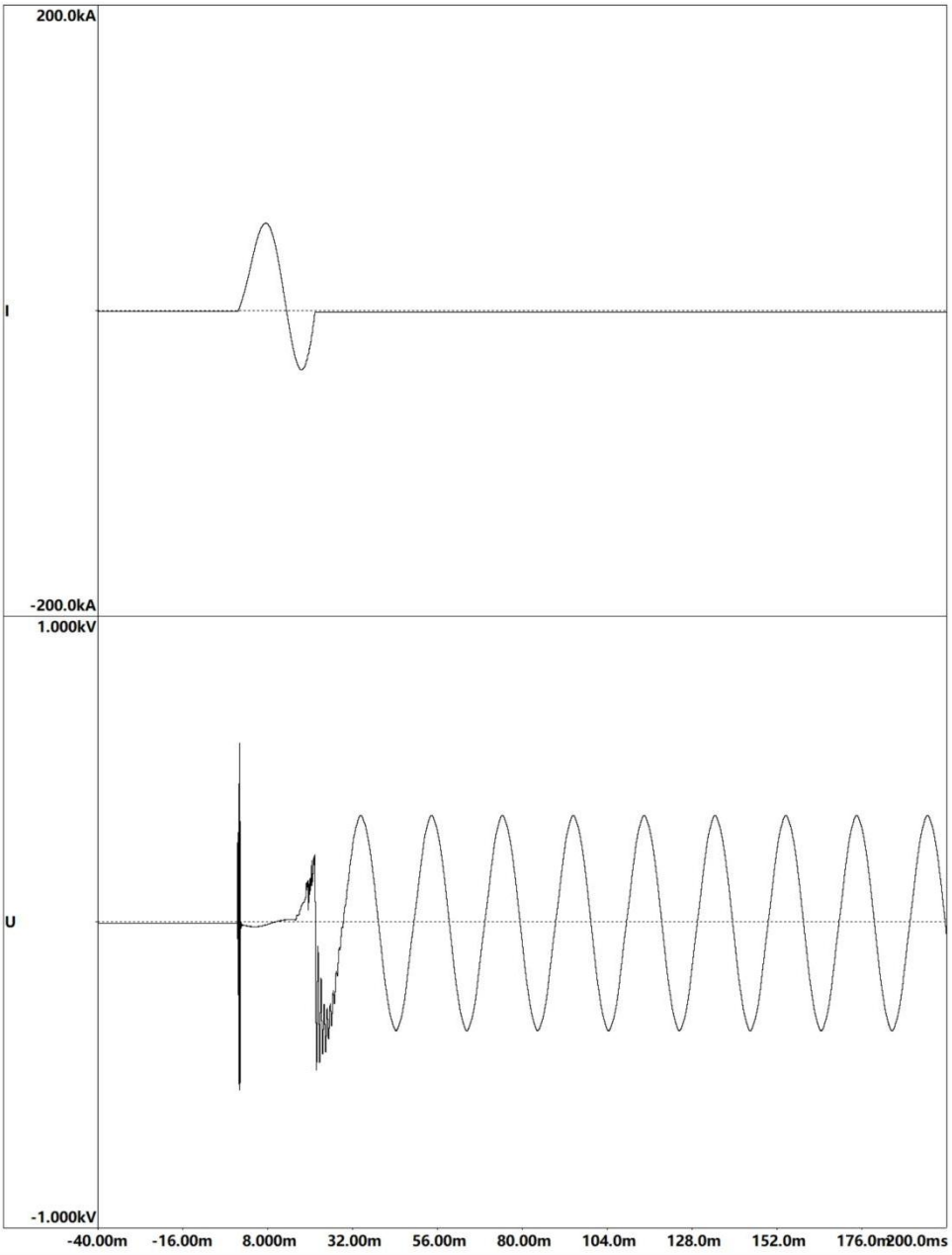
T= 8.13ms	Ta=2.95ms	Ip= 29.5kA
IIT_A= 2.00MA²s	IIT_B= 1.02MA²s	IIT_C= 2.84MA²s

Short-Circuit Breaking Capacity(#1 A-PE)	03401-23-12068C-S	S202359051
1Phase	BlokSet 5000	#1#2#3
U= 245V	I/Ip= 48.6kA/103kA	cosφ= 0.23



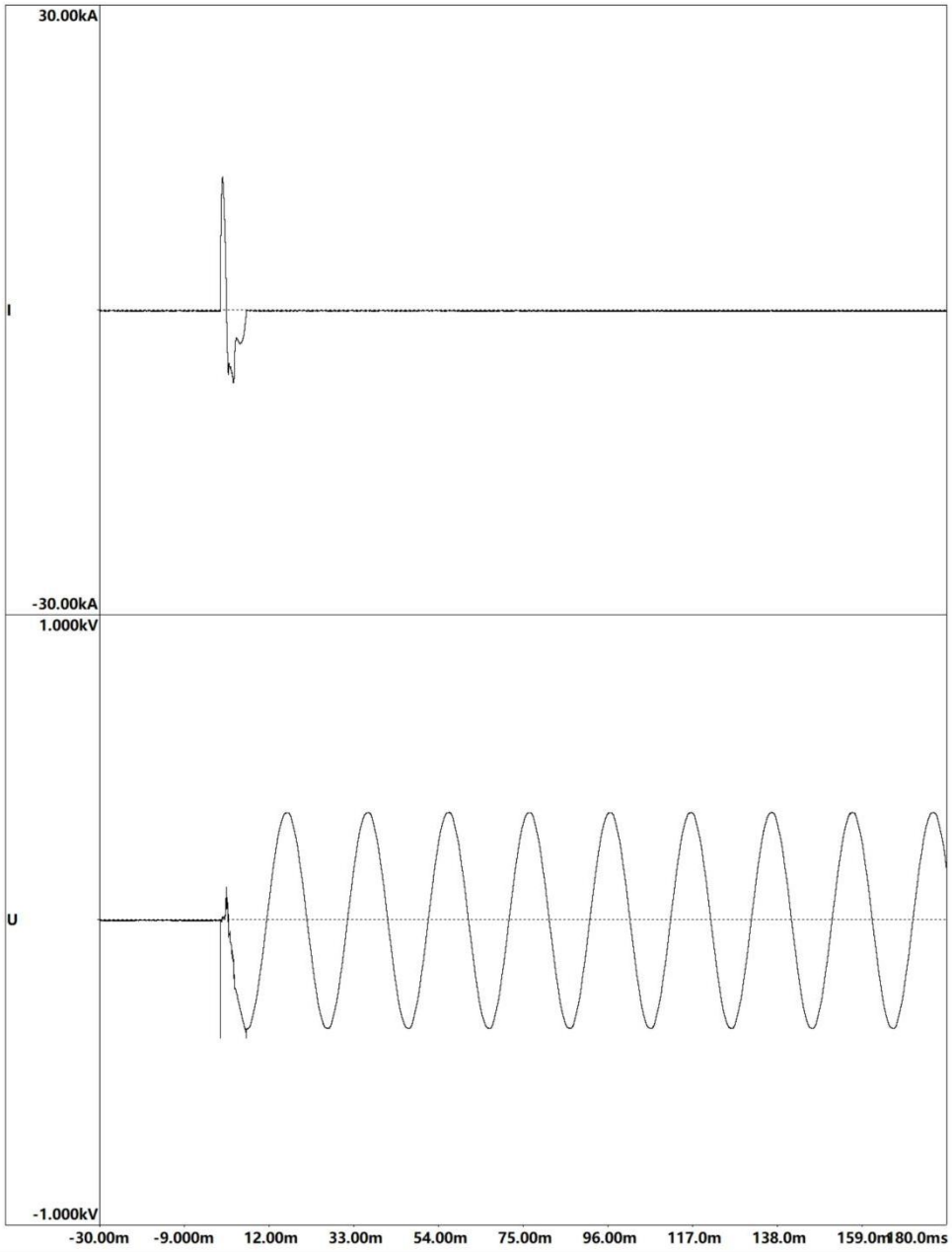
T= 27.6ms	Ta=2.63 ms	Ip= 97.5kA
IIT= 86.5MA²s		

Short-Circuit Breaking Capacity(#2 A-PE)	03401-23-12068C-S	S202359052
1Phase	BlokSet 5000	#1#2#3
U= 245V	I/Ip= 30.6kA/64.8kA	cosφ= 0.23



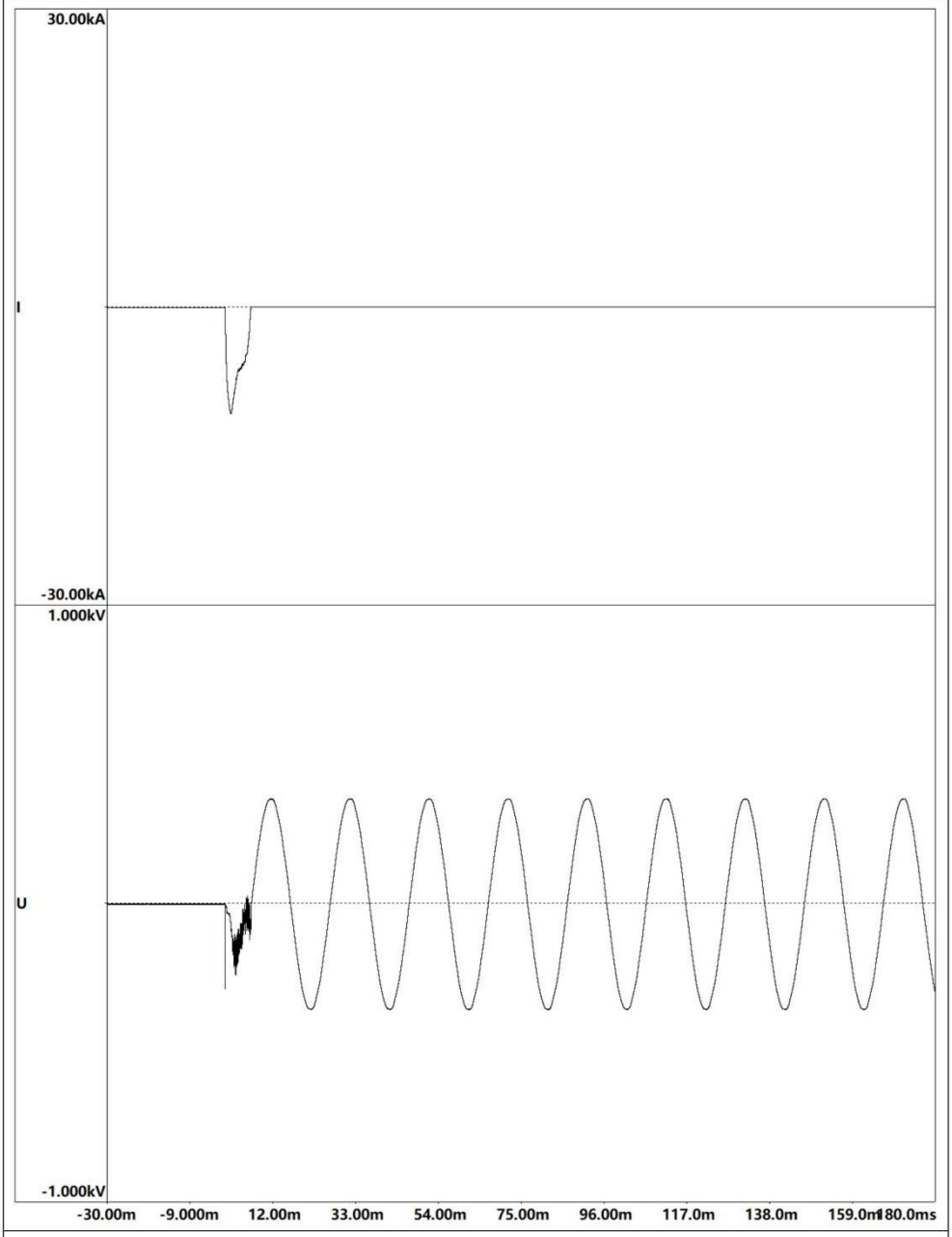
T= 21.8ms	Ta=2.24ms	Ip= 57.6kA
IIT= 26.4MA²s		

Short-Circuit Breaking Capacity(#3 C1)	03401-23-12068C-S	S202359053
1Phase	BlokSet 5000	#1#2#3
预期参数 U= 245V	I/Ip= 30.6kA/64.8kA	cosφ= 0.23



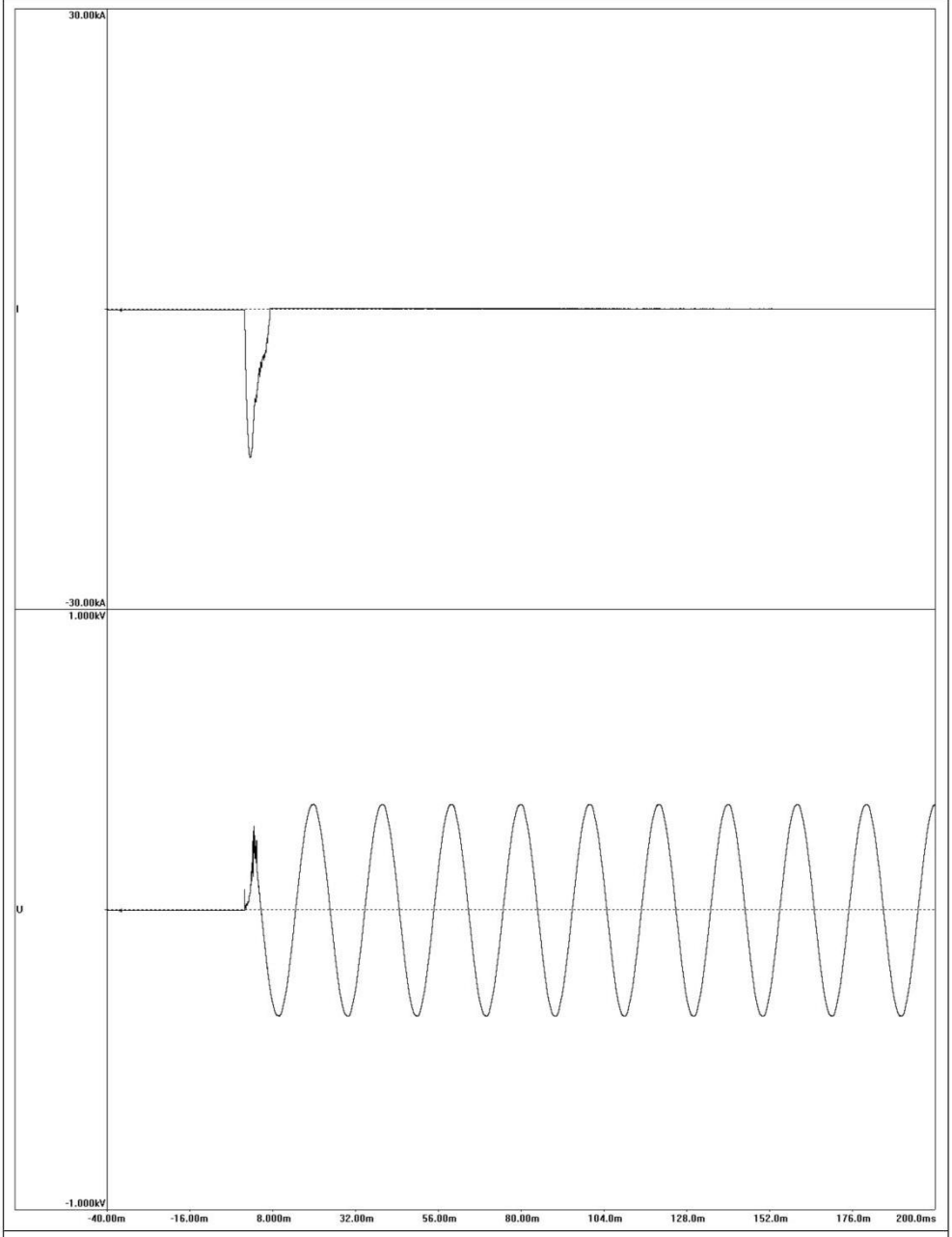
T= 6.56ms	Ta=2.05ms	Ip= 13.2kA
IIT= 228kA²s		

Short-Circuit Breaking Capacity(#3 C5)	03401-23-12068C-S	S202359054
1Phase	BlokSet 5000	#1#2#3
U= 245V	I/Ip= 30.6kA/64.8kA	cosφ= 0.23



T= 6.49ms	Ta=2.39ms	Ip= 10.7kA
IIT= 322kA²s		

Short-Circuit Breaking Capacity(#3 C7)	03401-23-12068C-S	S202359055
1Phase	BlokSet 5000	#1#2#3
U= 245V	I/Ip= 30.6kA/64.8kA	cosφ= 0.23



T= 7.90ms	Ta=2.07ms	Ip= 14.7kA
IIT= 561kA²s		

List of instruments and equipment

No.	Instrument Name	Model	Serial No.of instrument	Validity of calibration	Used（√ ）
1	Cronometro	JD-1A	02#	2024/10/16	√
2	Hot wire tester	AG-5113A	#870-85	2024/2/21	√
3	outside micrometer	0-25mm	1843958	2024/10/18	√
4	Pointer temperature and humidity meter	TH600Btype	Wsdj018	2024/4/14	√
5	Empty shell static load counterweight device (weight)	/	870-55	/	√
6	electric single beam crane	LX3-3.5 A3	731-9	/	√
7	electronic hoist scale	OCS-XZ-5	871-56	2024/8/4	√
8	hard wire	1.0mm、1N	1#	2024/8/4	√
9	Digital display push and pull meter	HG-500N	871-55	2024/10/18	√
10	Digital display push and pull meter	DS2-20N	871-62	2024/6/14	√
11	Test direct finger	SN3411	12030806	2024/8/4	√
12	Standard ball	12.5mm	AG2021012502	2024/8/4	√
13	vernier caliper	0-125mm	5113	2024/10/18	√
14	vernier caliper	0-150mm	8030293	2024/6/14	√
15	earth resistance tester	XH30A	870-65	2024/8/1	√
16	tapeline	5m*25mm	01#	2024/8/4	√
17	Program controlled withstand pressure test device	XH2680A	870-38	2024/10/15	√
18	temperature and humidity indicator	TH600Btype	Wsdj012	2024/4/14	√
19	temperature and humidity indicator	TH600Btype	Wsdj019	2024/4/14	√
20	aneroid barometer	DYM3	4004	2024/8/4	√
21	Impulse voltage tester	GC-30T	870-93	2024/2/21	√
22	Temperature data acquisition system	XH100	870-97-2	2024/10/18	√
23	Temperature data acquisition system	XH100	870-97-3	2024/10/18	√
24	Low voltage complete equipment temperature rise experiment device	IN-51	870-96	2024/2/21	√
25	rogowski coil	1100series	FL-7822 FL-7823 FL-7824	2024/8/1	√
26	integrator	7000series	759-10	2024/8/1	√
27	Digital power meter	WT1600	870-56	2024/2/21	√
28	rogowski coil	1100series	FQ-3661 FQ-3662 FQ-3663	2024/8/1	√

29	integrator	7000series	759-7	2024/8/1	√
30	Data acquisition and processing system	120series3M-16-8	830-8-2	2024/8/1	√
31	Hand-held rain test device	IP-S	870-99	2024/8/1	√
32	High and low temperature alternating wet heat test chamber	GDJS-280	870-73	2024/10/18	√
33	Salt spray corrosion test chamber	YWX/Q-250	870-94	2024/10/18	√
34	Portable conductivity meter	DDBJ-350	870-126	2024/6/14	√
35	Pen PH meter	AS600type	871-63	2024/6/14	√
36	Loop resistance tester	HTHL-100B	870-84	2024/6/14	√

STATEMENT

1 The test report (including its copy) without the seal shall be considered as invalid.

2. The test report shall not be reproduced except in full, without written approval of the laboratory.

3. The test report without the signature of the preparing person, review person and approval person shall be considered as invalid.

4. Any corrections made on any parts of this test report shall be considered as invalid.

5. This result is only related to the samples delivered.

6. When the laboratory issues data and results that prove the role within the scope of the qualifications determined by the qualification certificate, it shall mark the qualification certificate mark of the inspection and testing institution, and affix a special seal for inspection and testing. When the laboratory is outside the scope of the ability to determine the qualification certificate, the inspection and testing report or certificate issued shall not be marked with the qualification certificate of the inspection and testing institution. The data and results have no proof role of society.

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