

POLIPAR	Test Report	FUSE CUT-OUT
Contents		
Number	Contents	Pages
1	Cover	
2	Contents	1
3	General	2
4	Photos of the samples	3
5	Test conclusion	4
6	Lightning impulse voltage tests	5
7	Power-frequency voltage dry tests	6
8	Power-frequency voltage wet tests	7
9	Temperature-rise test	8
10	Diagram of measuring points of temperature-rise	9
11	Mechanical test	10
12	Operating time-current characteristics test	11~12
13	Pre-arcing time-current characteristics test	13~14
14	Breaking test	15~20
15	Assembly	22
16	Schematic diagram of power-frequency withstand voltage test	23
17	Schematic diagram of lightning impulse withstand voltage test	24
18	Schematic diagram of breaking test	25~26
19	Oscillogram of lightning impulse withstand voltage test	27
20	Oscillogram of operating time-current characteristics test	28~33
21	The prospective oscillogram of breaking test	34~38
22	TRV of breaking test	39~42
23	Oscillogram of breaking test	43~60
24	Mechanical test	61
25	Thermal cycle and torque tests	62
26	Torque tests	63
27	Radio interference voltage (r.i.v.) tests	64
28	Dimensional and Galvanising Test	65
29	Measurement of Resistance of fuse-links is for resistance test	66
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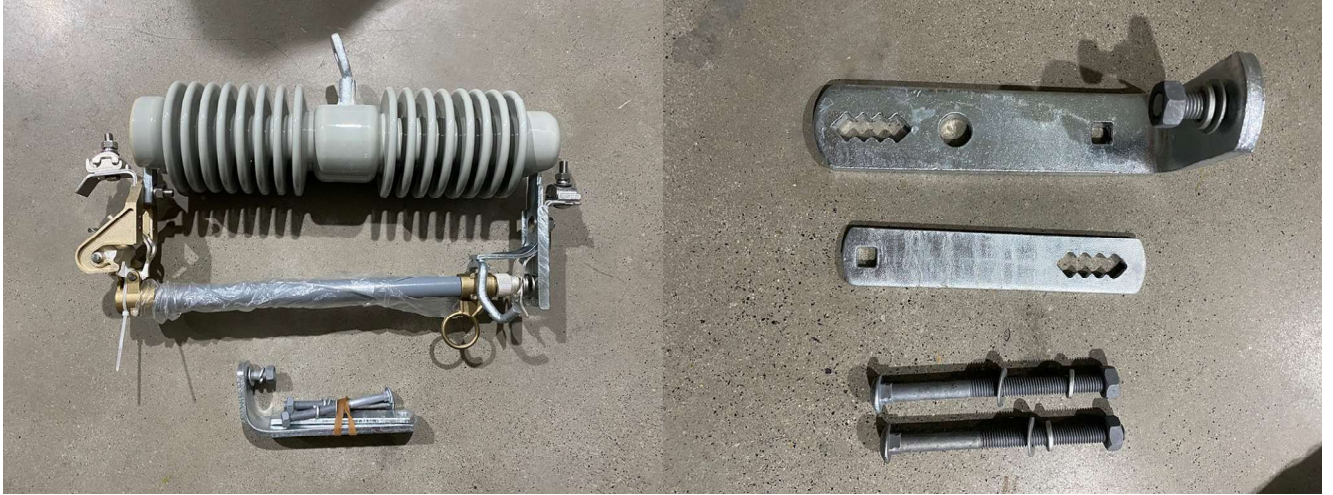
POLIPAR		Test Report		FUSE CUT-OUT	
General					
Test category		Type test			
Type and name of the samples		Fuse cutouts			
Manufacturer		Erkan Elektromekanik A.Ş (Polipar Brand Owner)			
Address		1203. Street No: 38/L-5/D Ostim Organized Industrial Area, Ankara/Türkiye, Postcode: 06374			
Manufacturing date		2021-12			
Main technical parameters of the samples	Rated voltage (kV)		38		
	Rated current (A)		100		
	Rated frequency (Hz)		50		
	Rated current of the fuse-base (A)		300		
	Rated current of the equipped fuse-link (A)		6、 100		
	Rated breaking current (kA)		5		
	Power-frequency withstand voltage dry test (phase to earth) (kV)		70		
	Power-frequency withstand voltage dry test (distance) (kV)		80		
	Power-frequency withstand voltage wet test (phase to earth) (kV)		70		
	Power-frequency withstand voltage wet test (distance) (kV)		80		
	Lightning impulse withstand voltage dry test (phase to earth) (kV) Peak		170		
	Lightning impulse withstand voltage dry test (distance) (kV) Peak		195		
	Description		36kV Porcelain Fuse Cutout		
Test period: From June. 3, 2022 to June. 15, 2022					

POLIPAR

Test Report

FUSE CUT-OUT

Photos of the samples



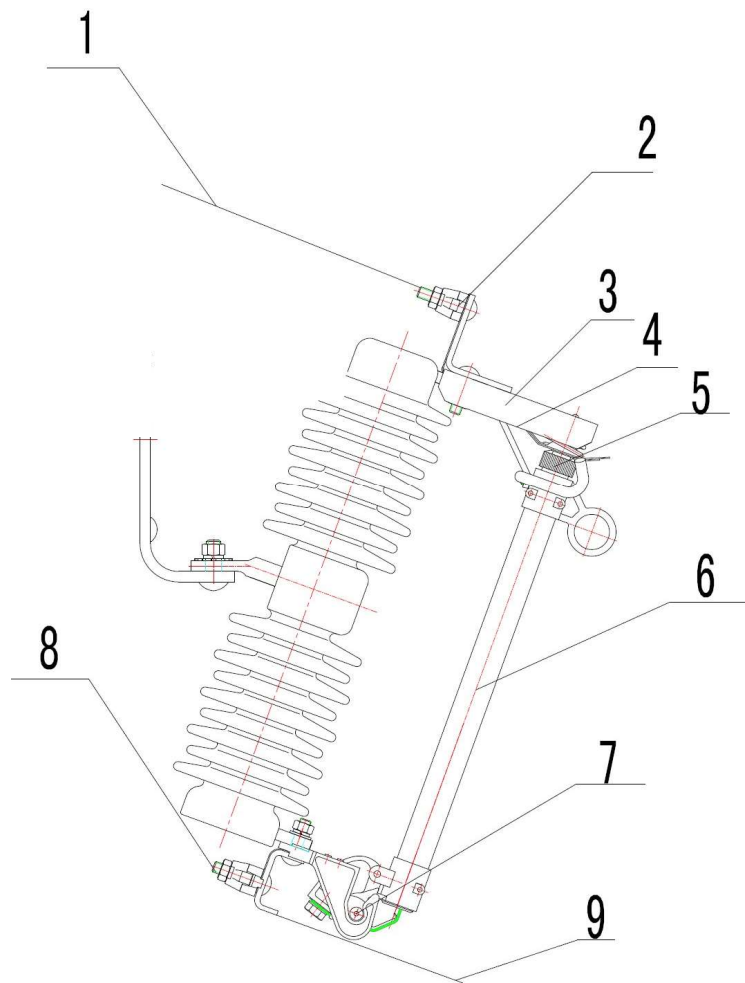
POLIPAR		Test Report		FUSE CUT-OUT	
Test conclusion					
Manufacturer	Erkan Elektromekanik A.Ş (Polipar Brand Owner)				
Type of the samples	FUSE CUT-OUT				
Name of the samples	Fuse cutouts				
Manufacturer	Erkan Elektromekanik A.Ş (Polipar Brand Owner)				
Test items and results	Power-frequency voltage dry tests [phase to earth: 35kV 1min; fracture: 39kV 1min]	PASS			
	Power-frequency voltage wet tests [phase to earth:30kV 1min]	PASS			
	Lightning impulse voltage dry tests [phase to earth: 95kVPeak;fracture: 105kVPeak]	PASS			
	Temperature-rise test[100A]	PASS			
	Breaking tests1[15.5kV, 8kA, 6A and 100A 3 times each]	PASS			
	Breaking tests2[15.5kV, 4.8~6.4kA, 6A and 100A 3 times each]	PASS			
	Breaking tests3[15.5kV, 1.6~2.4kA, 6A and 100A 1 time each]	PASS			
	Breaking tests4[15.5kV, 400~500A, 6A 2 times each]	PASS			
	Breaking tests5[15.5kV, 162~198A, 6A 2 times each]	PASS			
	Pre-arcing time-current characteristics test	PASS			
	Operating time-current characteristics test	PASS			
	Mechanical tests: Mechanical testing of fuse bases and fuse-carrying parts [500times"CO"]	PASS			
	Thermal Cycle test	PASS			
	Torque test	PASS			
	Dimensional and Galvanising test	PASS			
	Radio interference voltage (r.i.v.) tests	PASS			
	Measurement of Resistance of fuse-links	PASS			
Test standards	IEEEStdC 37.41 IEEE Standard Design Tests for High-Voltage(>1000V)Fuses and Accessories				
	IEEE Std C 37.42 IEEE Standard Specifications for High-Voltage(>1000V)Fuses and Accessories				
Test conclusion	The tests have been carried out from 6/3-6/15/2022. the test items meet the relevant clauses of above test standards and technical specifications, and the samples have passed the tests.				
Compiled by:	Proofread by:	Checked by:	Approved by:		
Date:	Date:	Date:	Date:		

POLIPAR

Test Report

FUSE CUT-OUT

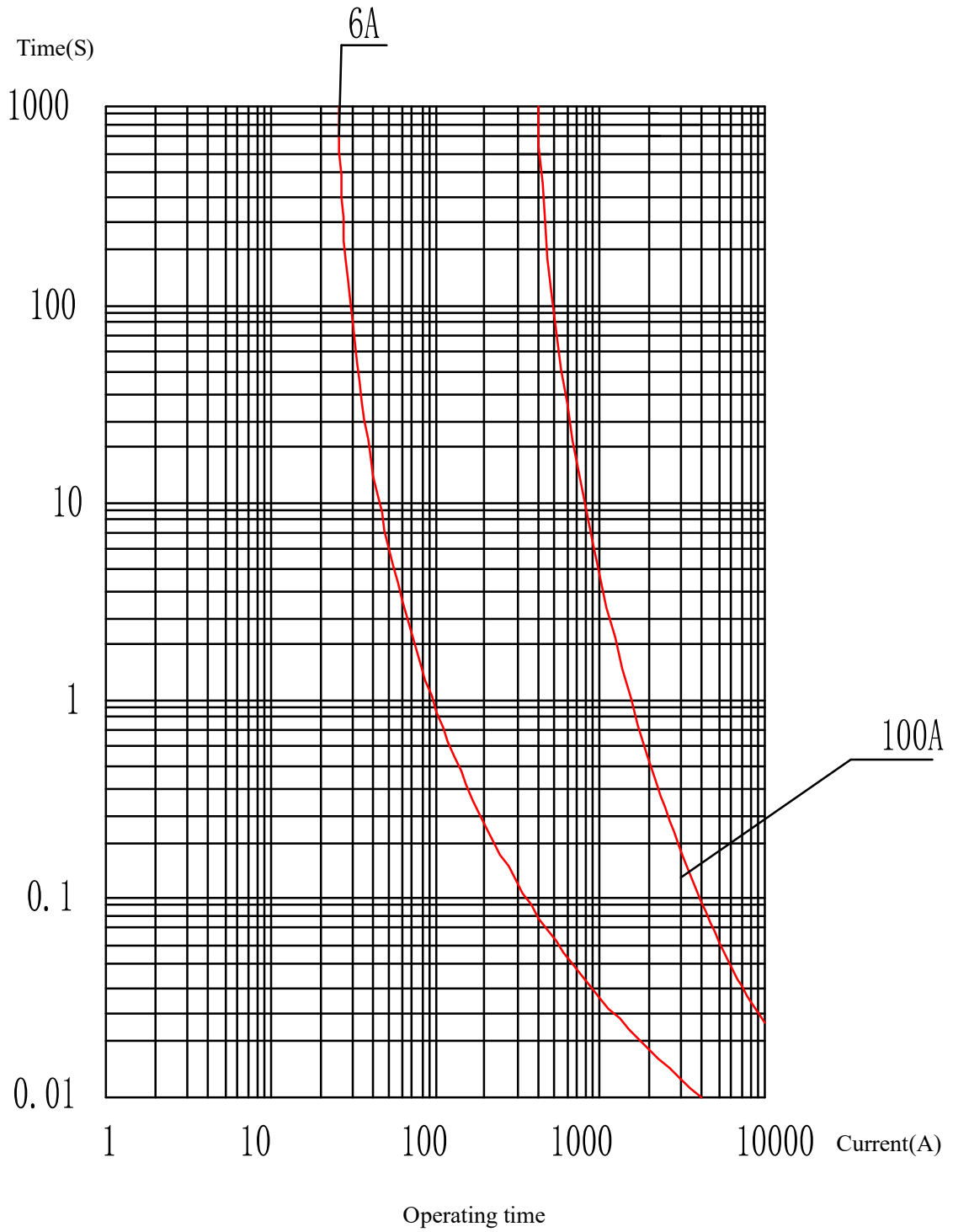
Diagram of measuring points of temperature-rise



POLIPAR	Test Report	FUSE CUT-OUT
Mechanical test		
Test date: June. 06, 2022		
<p>1. Mechanical strength of fuse-base and fuse-carrier</p> <p>200 times of closing and 200 times of opening are made respectively on three fuses</p> <p>At the conclusion of the operations, the fuses shall be in an operable condition with no failure in the insulators and mechanical performance.</p>		
Test date: June 06, 2022		
<p>2. Mechanical strength of fuse-links</p> <p>a) Static test:</p> <p>The specified axial tensile forces of 60 N are applied on one fuse-link gradually, with no precipitous action. No any damage is observed on the fuse-link after 30min. (such as rupture, loosening, slipping of connections, or elongation of components)</p> <p>b) Dynamic test:</p> <p>The fuse-links are installed on the fuse according to normal service condition and 20 times of closing and 20 times of opening are made respectively.</p> <p>After the operations, no any damage is observed on the fuse by visual inspection. (such as rupture, elongation of components, loosening or slipping of connections)</p>		
<p>Note: The test Passed.</p>		

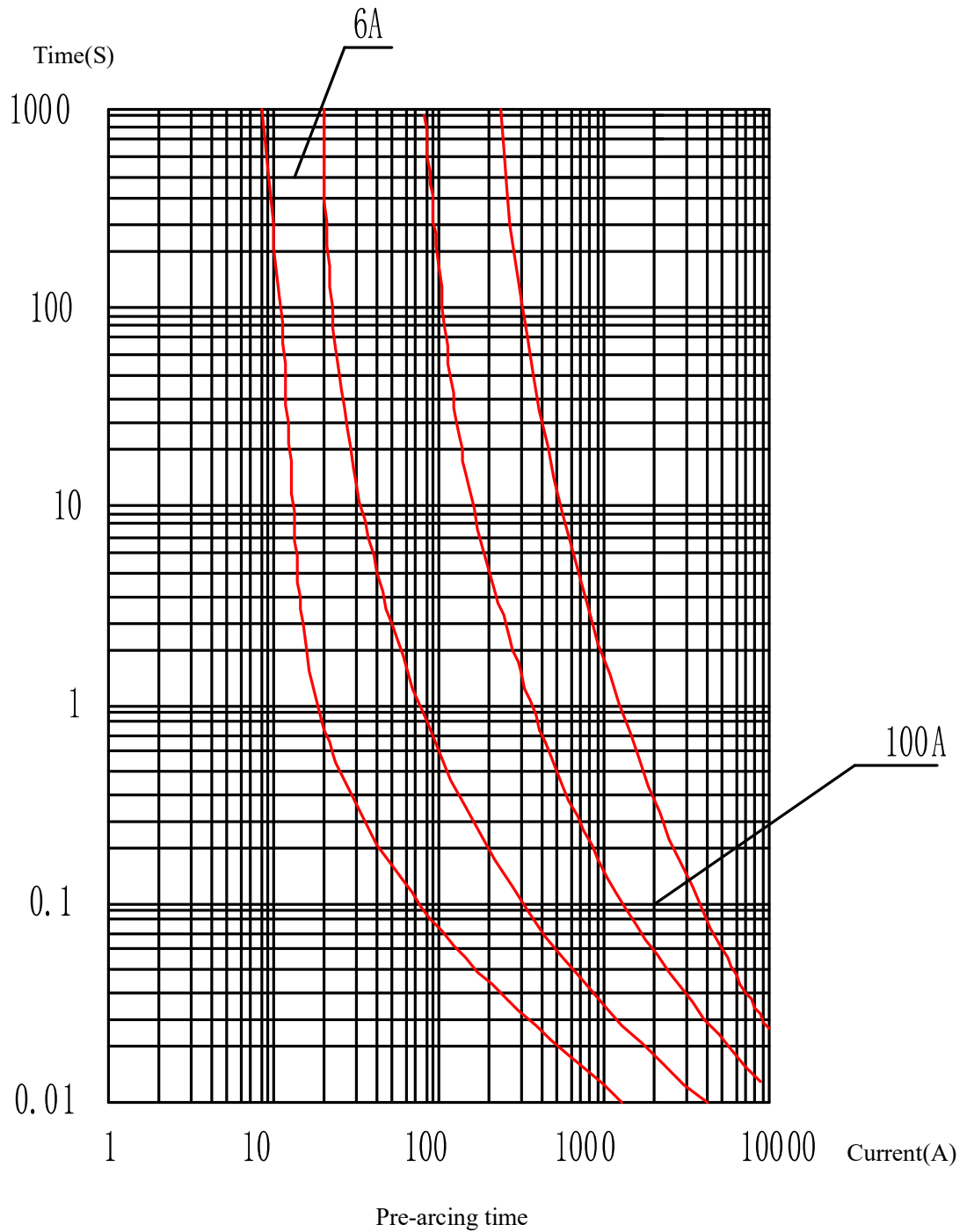
Operating time-current characteristics curves

No: /



Pre-arcing time-current characteristics curves

No: /



POLIPAR		Test Report										FUSE CUT-OUT				
Breaking test												TRV				
Test contents, methods, circuit, conditions and prospective values												U _c (kV)	t ₃ (μs)			
Test items	Test operating sequence or test parts	Test times	Test phases	Test methods	Test circuit	Test line voltage (kV)	Breaking current I _k (kA)	Peak withstand current (kA)	Short-time withstand current (kA)	Short-circuit duration (s)	Closing angle after voltage exceed zero (°)	Power factor	Source impedance of the circuits (%)	Power-frequency recovery voltage (kV)		
Test duty 1	O	3 times of 100A and 6A respectively		Direct test	/-3	36	5				*	<0.15		36	66.2	281
Test duty 2	O	3 times of 100A and 6A respectively		Direct test	/-3	36	3~4				*	<0.15		36	66.2	281
Test duty 3	O	1 time of 100A and 6A respectively		Direct test	/-3	36	1.0~1.5				85~105	<0.15		36	66.2	281
Test duty 4	O	6A 2 times		Direct test	/-3	36	0.4~0.5				Random	0.20~0.30		36	81.5	40
Test duty 5	O	6A 2 times		Direct test	/-4	36	0.0162~0.0198				Random	0.60~0.80		36	/	/
*: the closing phase angles of three times test on duty 1 and duty 2:-5°~15°(the first time), 85°~105°(the second time), 130°~150°(the third time).																

POLIPAR		Test Report										FUSE CUT-OUT	
Breaking test duty 1													
Test date: June. 10, 2022 Source side cosφ: <0.15 Prospective TRV: U _c (kV)=66.2 t ₃ (μs)=281													
Test duty	Oscillogram No	Test voltage (kV)	(prospective) Breaking current (kA)	Rated current of the fuse (A)	Cut-off current (kA)	Duration (ms)	Power-frequency recovery voltage (kV)	Power factor of circuit	Closing angle after voltage exceed zero (°)	TRV		Status of the sample	
										U _c (kV)	t ₃ (μs)		
Metallic short-circuit	/-Y001	36.4	5.1									Checking circuit	
Circuit adjustment	/-TRV001									66.8	281		
1	/-T001	36.4	(5.1)	6	10.0	15.9	36.1	0.04	1			OK	
1	/-T002	36.4	(5.1)	100	11.1	15.5	36.1	0.04	13			OK	
1	/-T003	36.4	(5.1)	6	6.0	9.1	36.1	0.04	91			OK	
1	/-T004	36.4	(5.1)	100	6.8	10.3	36.1	0.04	82			OK	
1	/-T005	36.4	(5.1)	6	1.0	3.7	36.1	0.04	146			OK	
1	/-T006	36.4	(5.1)	100	10.7	17.5	36.1	0.04	146			OK	
Status of the sample before the test: /													

POLIPAR		Test Report										FUSE CUT-OUT		
Breaking test duty 2														
Test date: June. 10, 2022 Source side cosφ: <0.15 Prospective TRV: $U_c(kV)=66.2$ $t_3(\mu s)=281$														
Test duty	Oscillogram No	Test voltage (kV)	(prospective) Breaking current (kA)	Rated current of the fuse (A)	Cut-off current (kA)	Duration (ms)	Power-frequency recovery voltage (kV)	Power factor of circuit	Closing angle after voltage exceed zero (°)	TRV		Status of the sample		
										U_c (kV)	t_3 (μs)			
Metallic short-circuit	/-Y002	36.4	3.5									Checking circuit		
Circuit adjustment	/-TRV002									66.9	281			
2	/-T007	36.4	(3.5)	6	6.4	15.5	36.1	0.04	2			OK		
2	/-T008	36.4	(3.5)	100	7.2	15.4	36.1	0.04	11			OK		
2	/-T009	36.4	(3.5)	6	3.9	9.2	36.1	0.04	87			OK		
2	/-T010	36.4	(3.5)	100	5.7	18.7	36.1	0.04	104			OK		
2	/-T011	36.4	(3.5)	6	1.8	5.4	36.1	0.04	132			OK		
2	/-T012	36.4	(3.5)	100	6.7	17.8	36.1	0.04	142			OK		
Status of the sample before the test: /														

POLIPAR		Test Report						FUSE CUT-OUT				
Breaking test duty 3												
Test date: June. 10, 2022												
Source side cosφ: <0.15												
Prospective TRV: $U_c(kV)=66.2$ $t_3(\mu s)=281$												
Test duty	Oscillogram No	Test voltage (kV)	(prospective) Breaking current (kA)	Rated current of the fuse (A)	Cut-off current (kA)	Duration (ms)	Power-frequency recovery voltage (kV)	Power factor of circuit	Closing angle after voltage exceed zero (°)	TRV		Status of the sample
										U_c (kV)	t_3 (μs)	
Metallic short-circuit	/-Y003	36.4	1.2									Checking circuit
Circuit adjustment	/-TRV003									67.1	281	
3	/-T013	36.4	(1.2)	6	1.4	9.0	36.1	0.04	86			OK
3	/-T014	36.4	(1.2)	100	1.8	20.1	36.1	0.04	88			OK
Status of the sample before the test: /												

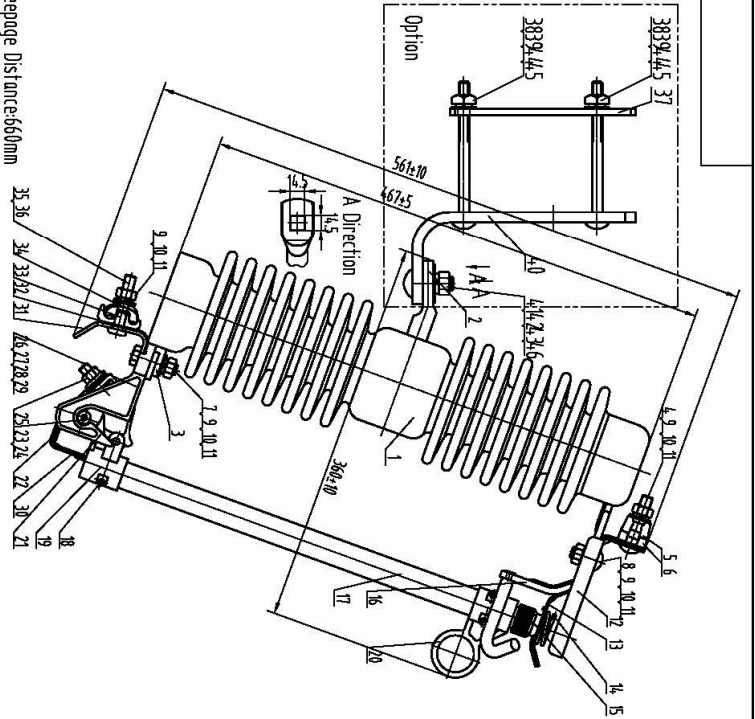
POLIPAR		Test Report						FUSE CUT-OUT				
Breaking test duty 4												
Test date: June. 10, 2022												
Source side cosφ: 0.2~0.3												
Prospective TRV: $U_c(kV)=81.5$ $t_3(\mu s)=40$												
Test duty	Oscillogram No	Test voltage (kV)	(prospective) Breaking current (kA)	Rated current of the fuse (A)	Cut-off current (kA)	Duration (ms)	Power-frequency recovery voltage (kV)	Power factor of circuit	Closing angle after voltage exceed zero (°)	TRV		Status of the sample
										U_c (kV)	t_3 (μs)	
Metallic short-circuit	/-Y004	36.4	0.4									Checking circuit
Circuit adjustment	/-TRV004									82	41	
3	/-T015	36.4	(0.4)	6	0.6	8.7	36.1	0.25				OK
3	/-T016	36.4	(0.4)	6	0.7	18.4	36.1	0.25				OK
Status of the sample before the test: /												

POLIPAR		Test Report										FUSE CUT-OUT	
Breaking test duty 5													
Test date: June. 10, 2022 Source side cosφ: 0.60~0.80 Prospective TRV: $U_c(kV)=/$ $t_3(\mu s)=/$													
Test duty	Oscillogram No	Test voltage (kV)	(prospective) Breaking current (kA)	Rated current of the fuse (A)	Cut-off current (kA)	Duration (ms)	Power-frequency recovery voltage (kV)	Power factor of circuit	Closing angle after voltage exceed zero (°)	TRV		Status of the sample	
										U_c (kV)	t_3 (μs)		
Metallic short-circuit	/-Y005	36.4	18									Checking circuit	
5	/-T017	36.4	18	6		1028	36.1		0.7			OK	
5	/-T018	36.4	18	6		1050	36.1		0.7			OK	
Status of the sample before the test: /													

Assembly

No:

Min Creepage Distance:650mm



46	GB/T 93-1987	Spring washer 12	1	65Mn	
45	GB/T 93-1987	Spring washer 10	2	65Mn	
44	GB/T 95-2002	flat washer 10	2	20#	
43	62563-7	club washer	1	20#	
42	62563-6	Nut	1	20#	
41	62563-5	Flat Bolt	1	20#	
40	62563-4	Connecting bracket	1	Q235	
39	62563-3	Long bolt	2	Q235	
38	62563-2	Square Nut	2	20#	
37	62563-1	Connecting Plate	1	Q235	
36	62556-6	lower connector	1	bronze	
35	62556-5	flat bolt	1	SS	
34	62556-4	upper connector	1	bronze	

33	62556-3	lower connector	1	bronze	
32	62556-2	lower connector plate	1	bronze	
31	62556-1	lower connector base	1	SS	
30		fuse link	1		Note offered
29	GB/T 867-1986	pin 3X9	4	bronze	
28	62516-3	auxiliary contact	2	SS	
27	62516-2	conduct contact	2	bronze	
26	62516-1	Hinge	1	brass	
25	62665-1-4	nut	1	brnze	
24	GB/T 867-1986	river pin 5X82	1	SS	
23	62553-3-3	tweak spring	1	SS	
22	62515-1-2A	latch spring	1	SS	
21	62515-1-3	trunnion	1	brass	
20	62515-2A	pull ring	1	brass	
19	62705-5	tube holder	1	brass	
18	GB/T 119.1-2000B	column pin4X26	3	SS	
17	62622-1C	fuse tube	1	Fiber glass	
16	6270.11	hook	1	Galv steel	
15	62515-1A	upper cap	1	bronze	
14	62703-3	Spring	1	SS	
13	62703-4	upper contact plate	1	bronze	
12	62703-2	upper contact	1	Galv steel	
11	GB/T 6770-2000	nut M10	4	SS	
10	GB/T 93-1987	spring washer 10	4	SS	
9	GB/T 95-2002	flat washer 10	4	SS	
8	GB/T 12-1988	bolt M10X25	1	SS	
7	GB/T 12-1988	bolt M10X40	1	SS	
6	62512-2B	lower connector	1	bronze	
5	62512-1A	upper connector	1	bronze	
4	GB/T 12-1988	bolt M10X50	1	SS	
3	62551-3	fittings	1	Galv steel	
2	62551-2	Mounting pin	1	Galv steel	
1	62571-1	Insulator	1	Porcelain	

Outline drawing

6270H.0

DATE: 2011/7/26

SCALE: 1:4

QTY: 1

Material: POLIPAR

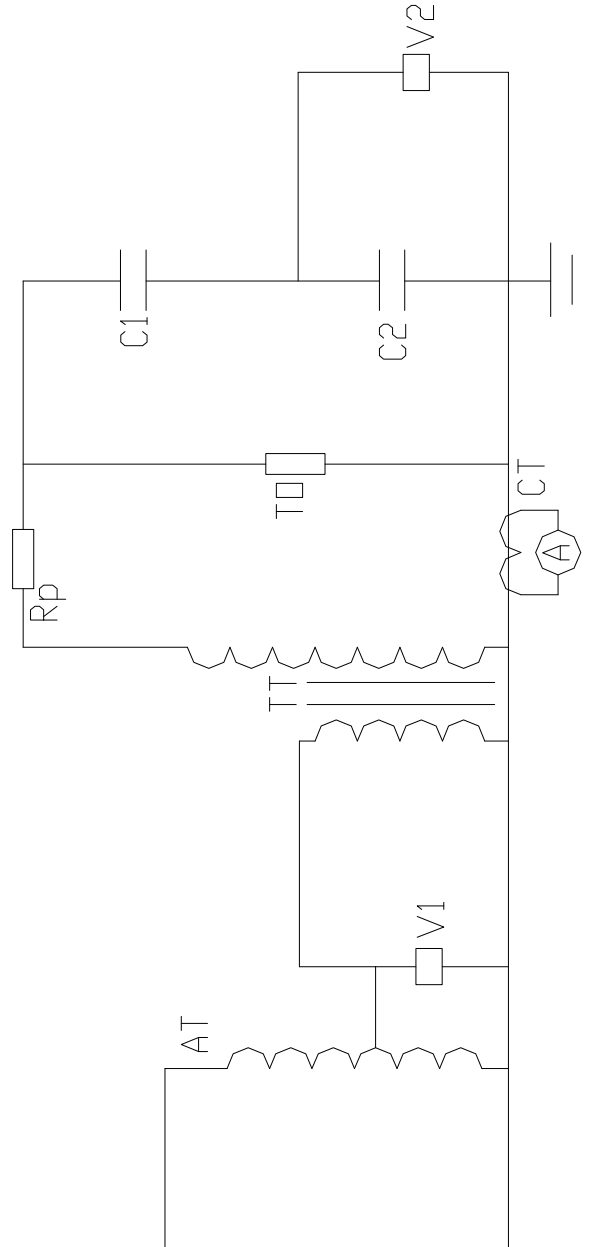
6270H.0

100A

36kV PORCELAIN CUTOUT

Schematic diagram of power-frequency withstand voltage test

No: /-1

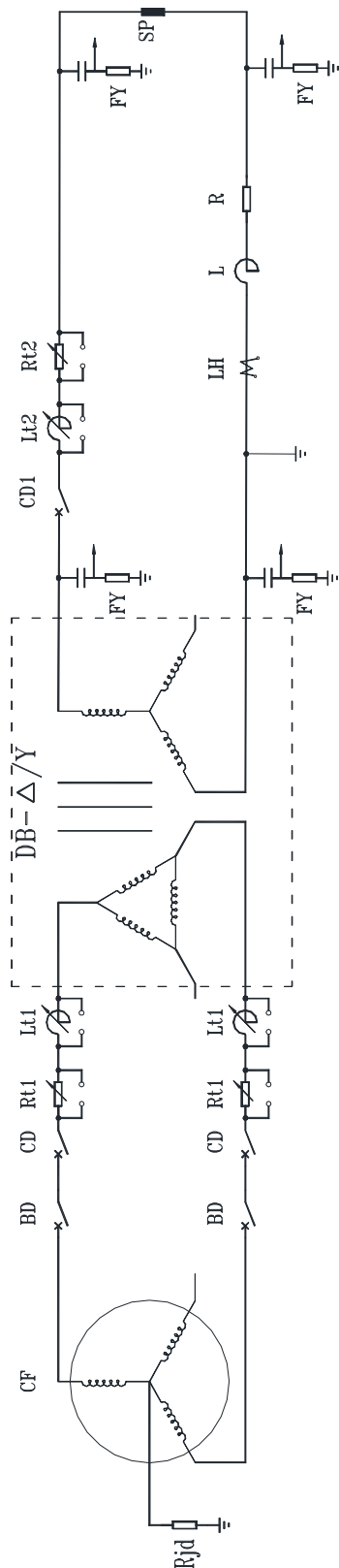


In the diagram:

- AT: Booster
- CT: Current transform
- TT: Power-frequency test transform
- RP: Protected resistance
- TO: Test object
- V1: Voltmeter
- A: Ammeter
- C1: HV arm capacitance of voltage divider
- C2: LV arm capacitance of voltage divider
- V2: Peak voltmeter

Schematic diagram of breaking test
(test duty 5)

No: /-4

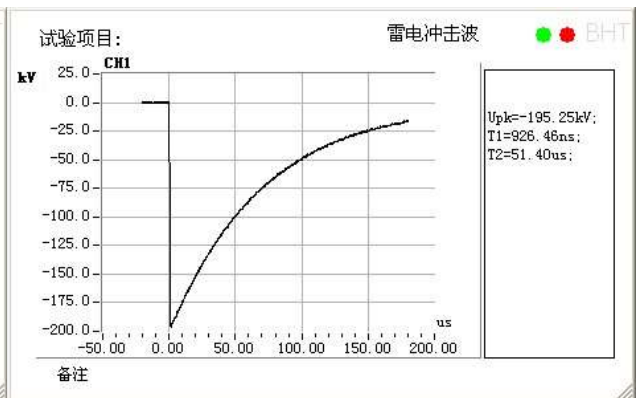
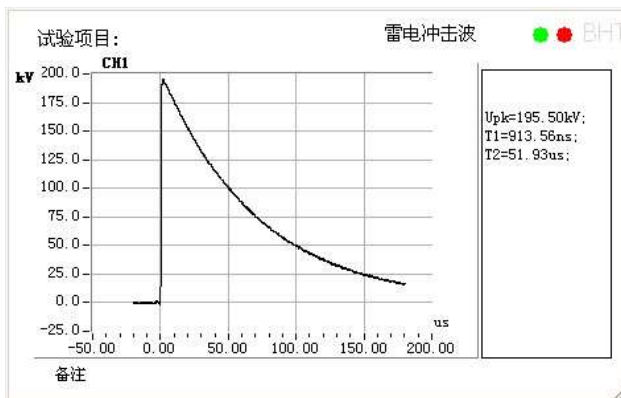
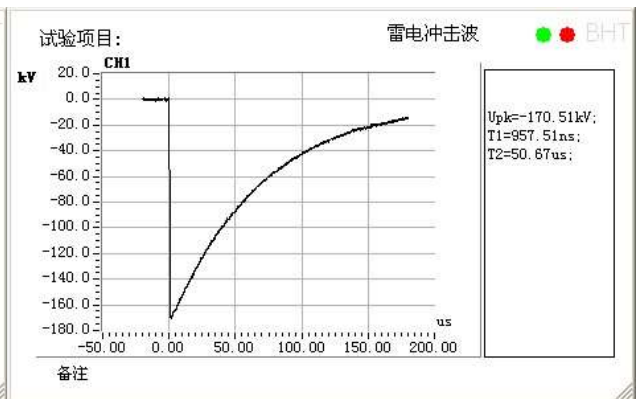
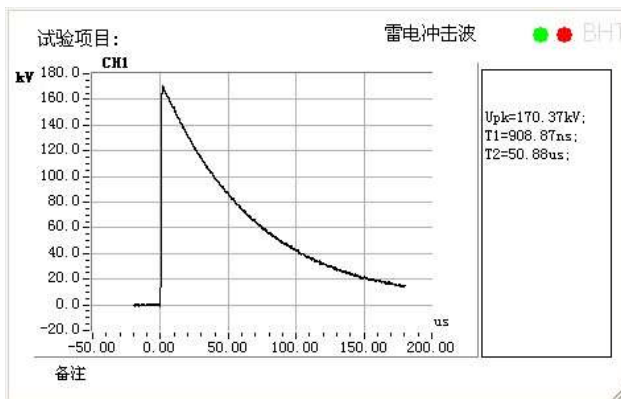


- CF---- 短路发电机 (short-circuit generator)
- Rt1---- 功率因数电阻 (power factor resistor)
- FY---- 分压器 (divider)
- Rt2---- 功率因数电阻 (power factor resistor)
- BD---- 保护断路器 (master circuit-breaker)
- Lt1---- 可调电抗器 (adjustable reactor)
- CD1---- 操作断路器 (operation circuit-breaker)
- SP---- 按钮 (test object)
- CD---- 操作断路器 (operation circuit-breaker)
- DB---- 短路变压器 (short-circuit transformer)
- Lt2---- 可调电抗器 (adjustable reactor)
- LH---- 电抗线圈 (current coil)

Oscillogram of lightning impulse withstand voltage test

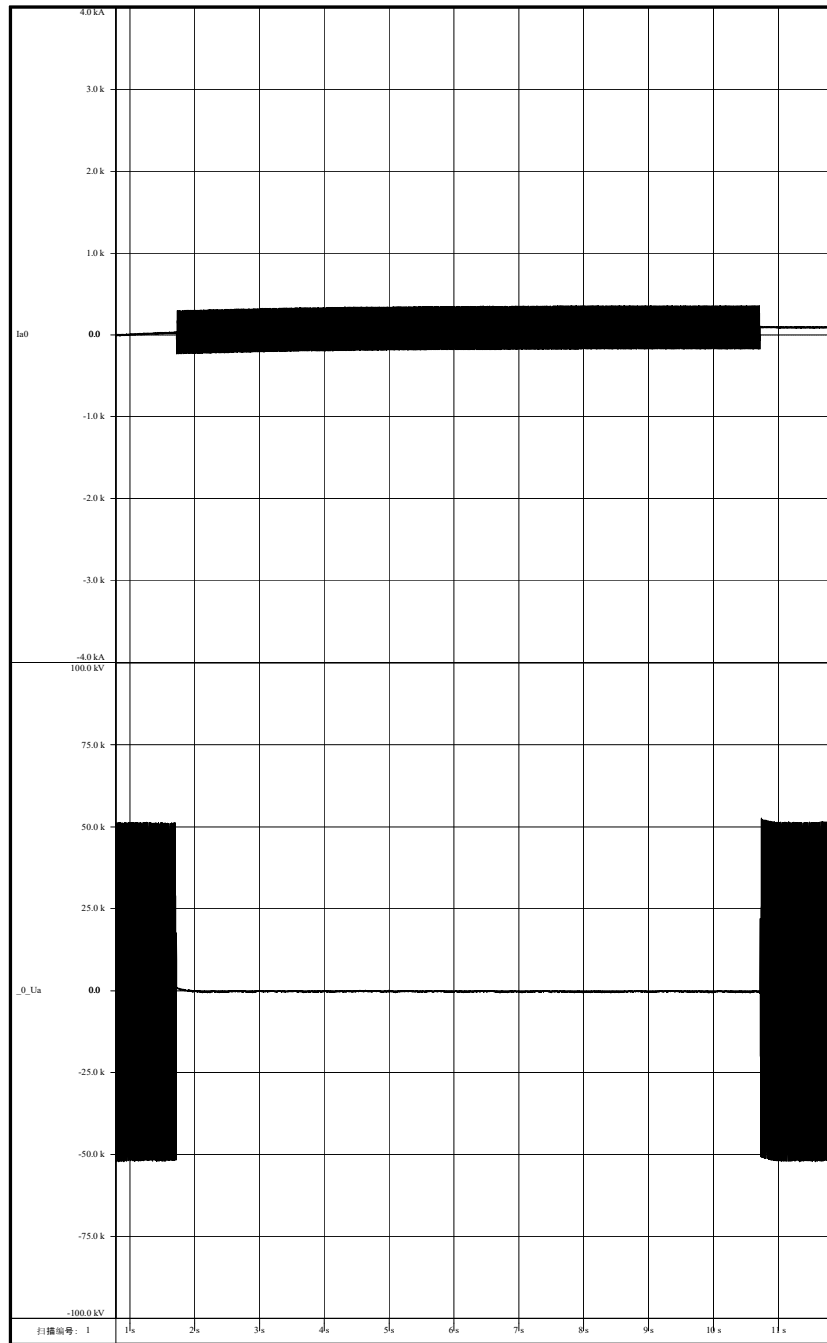
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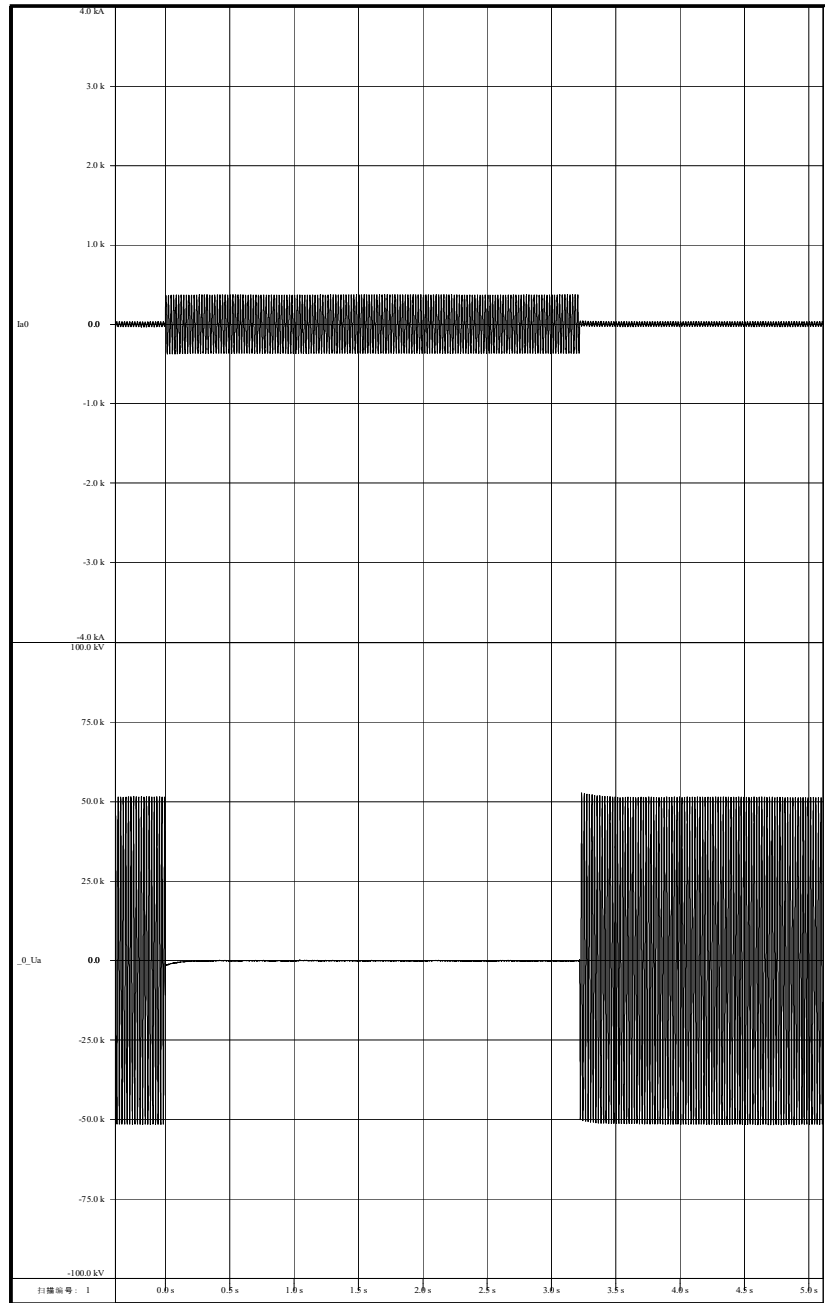
Oscillogram of operating time-current characteristics test

No: /-001



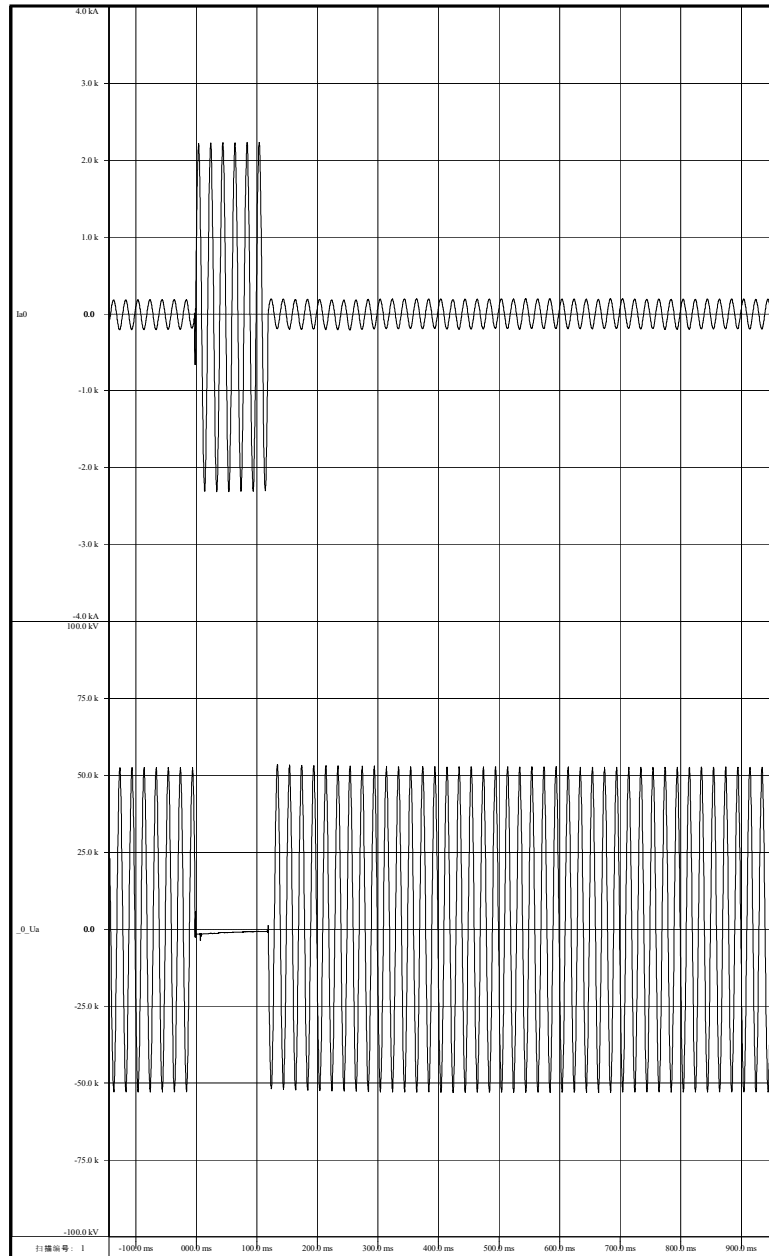
Oscillogram of operating time-current characteristics test

No: /-002



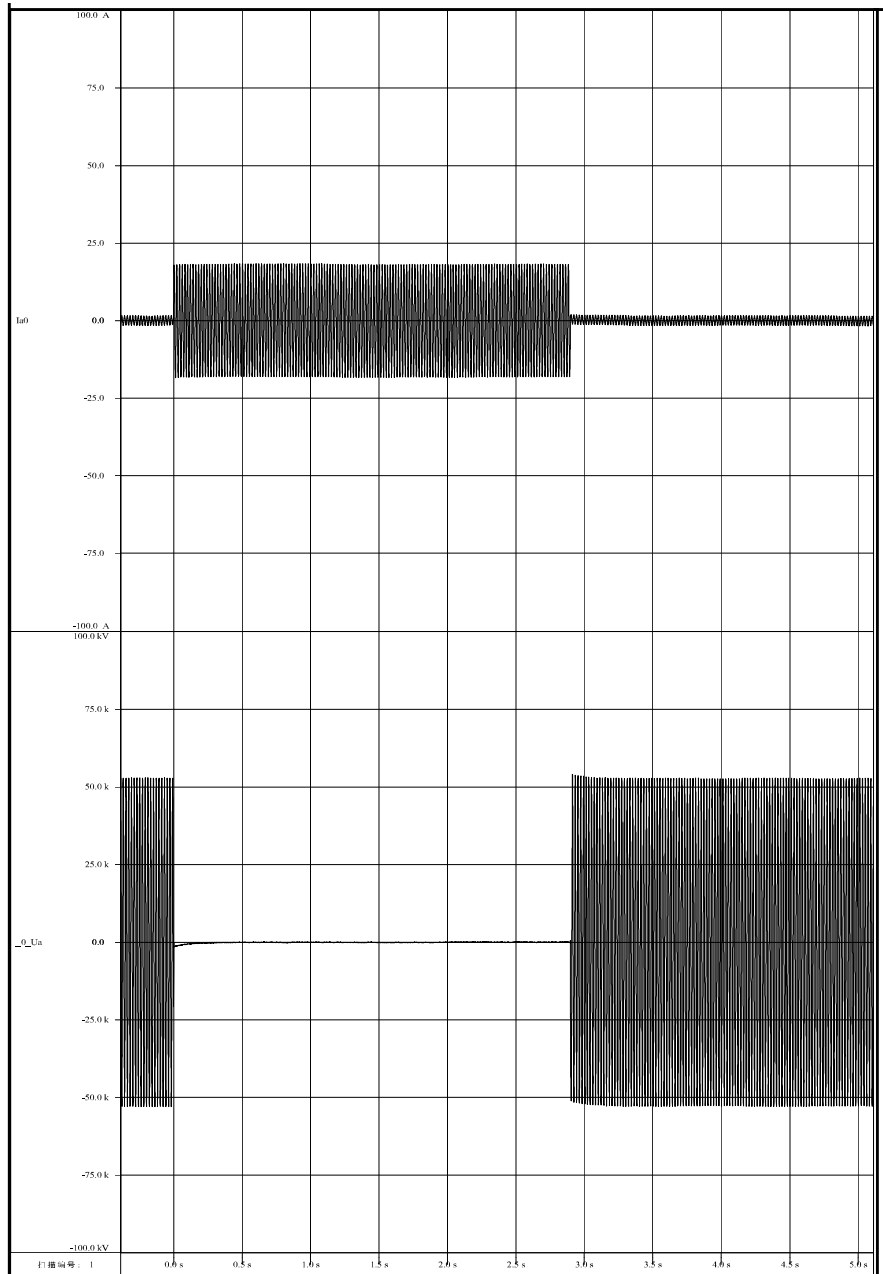
Oscillogram of operating time-current characteristics test

No: /-003



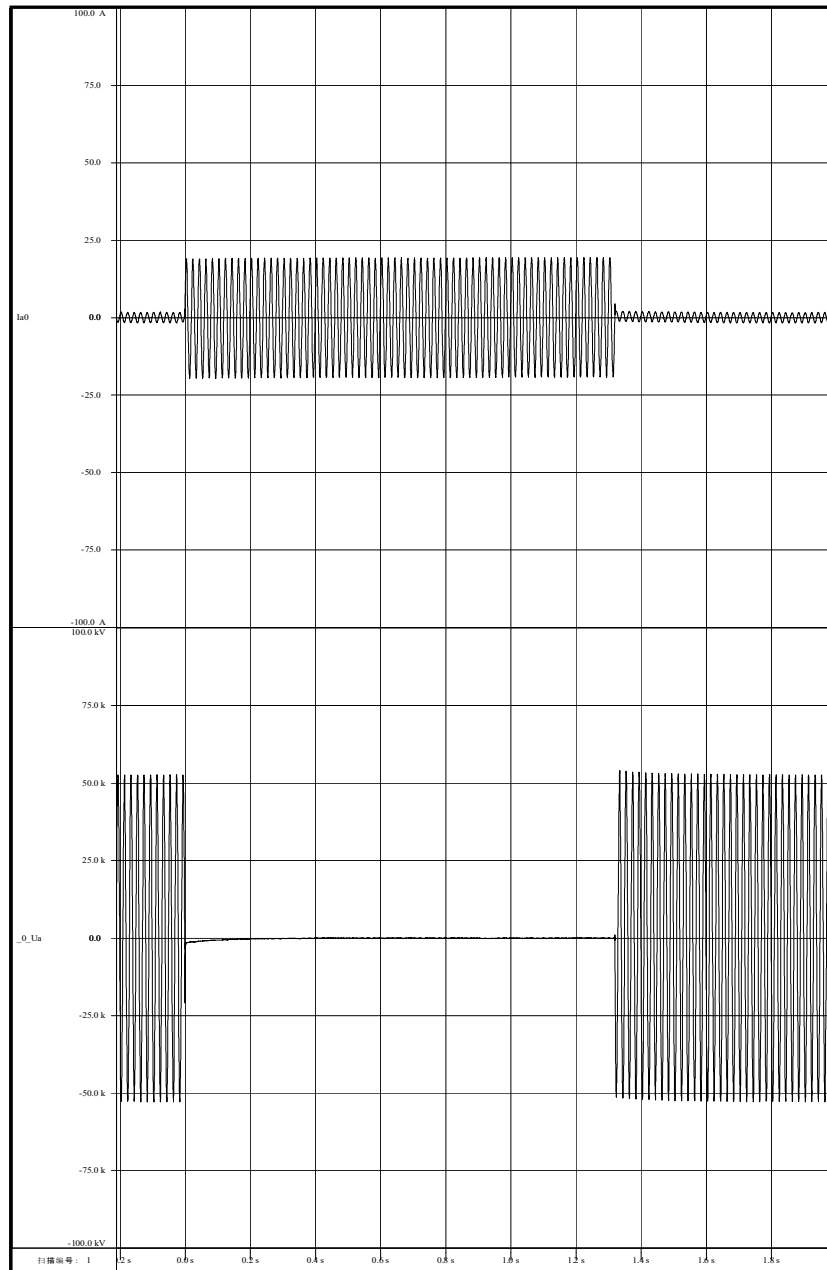
Oscillogram of operating time-current characteristics test

No: /-004



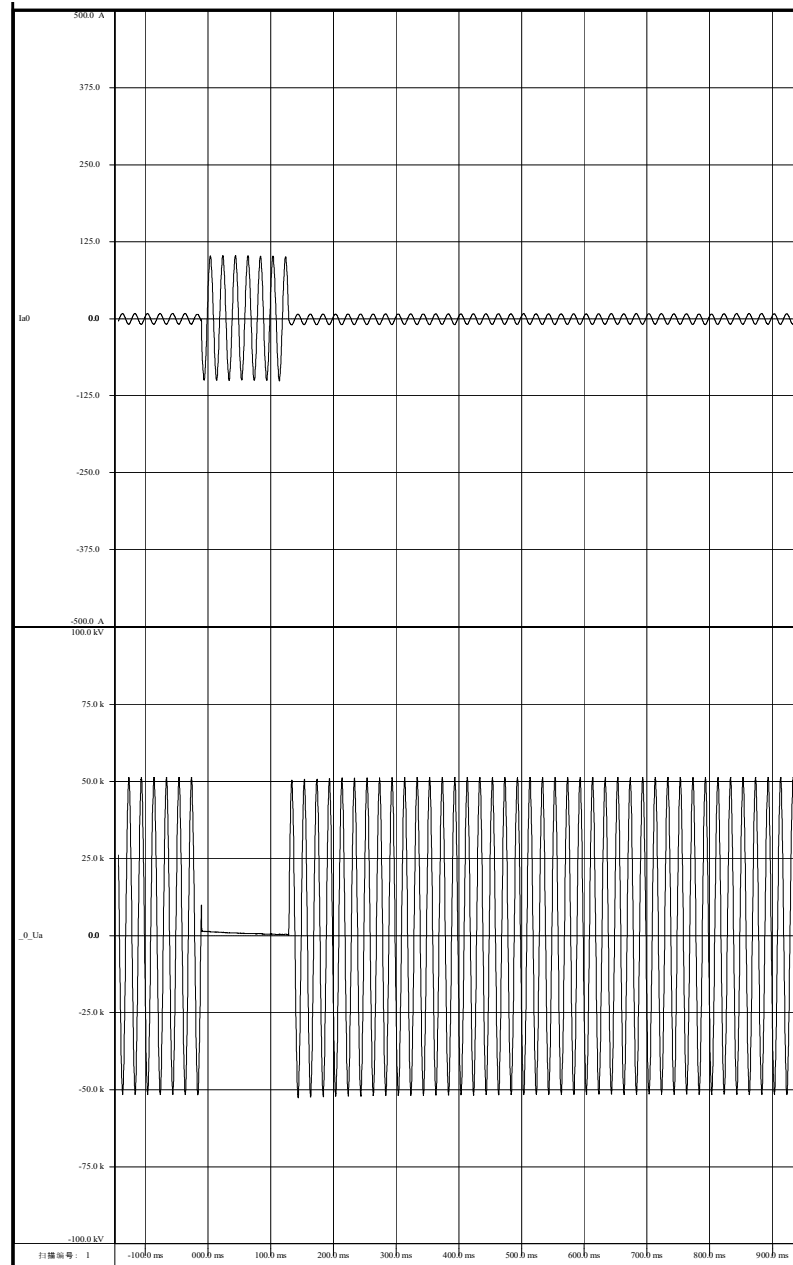
Oscillogram of operating time-current characteristics test

No: /-005



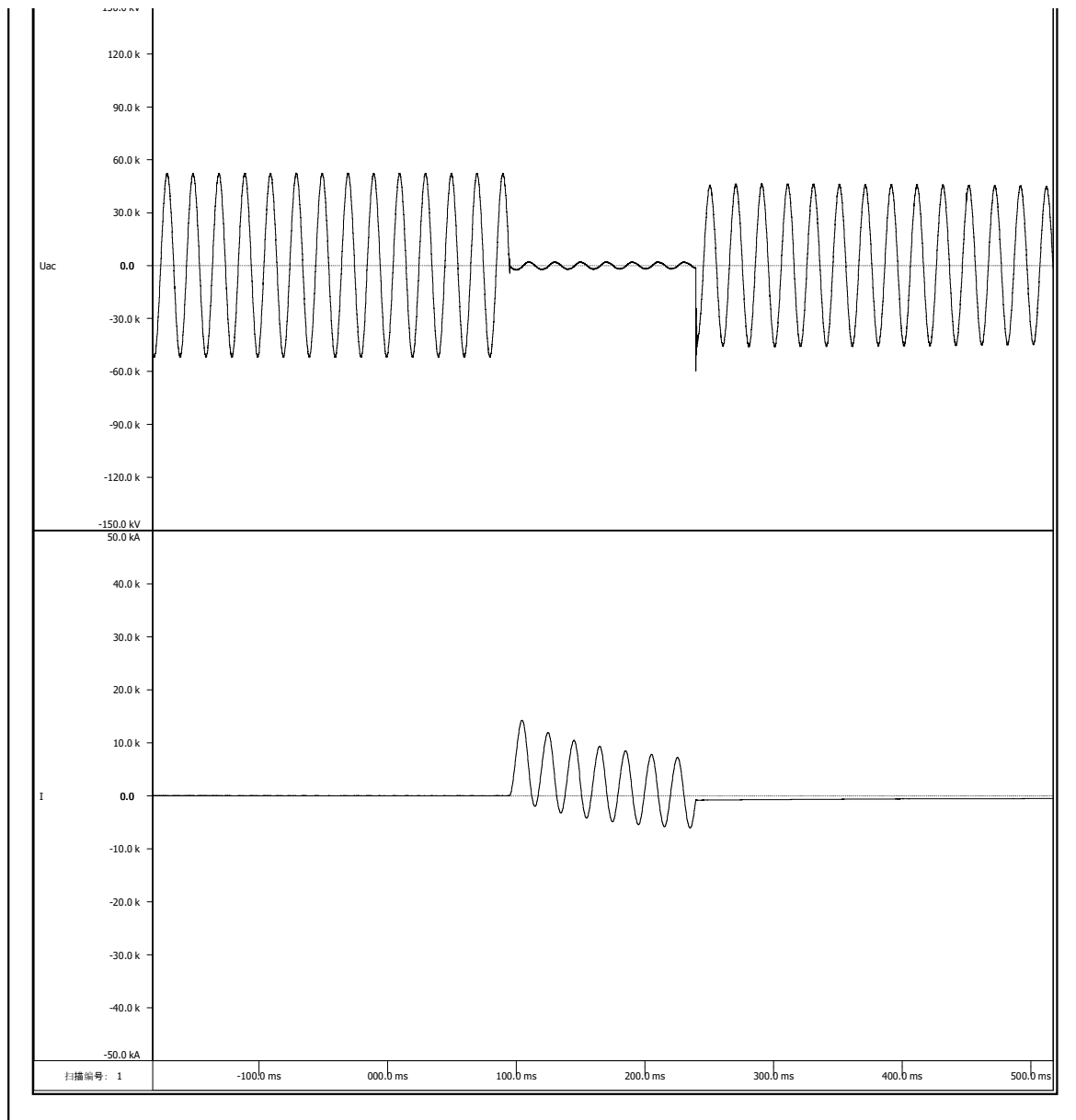
Oscillogram of operating time-current characteristics test

No: /-006



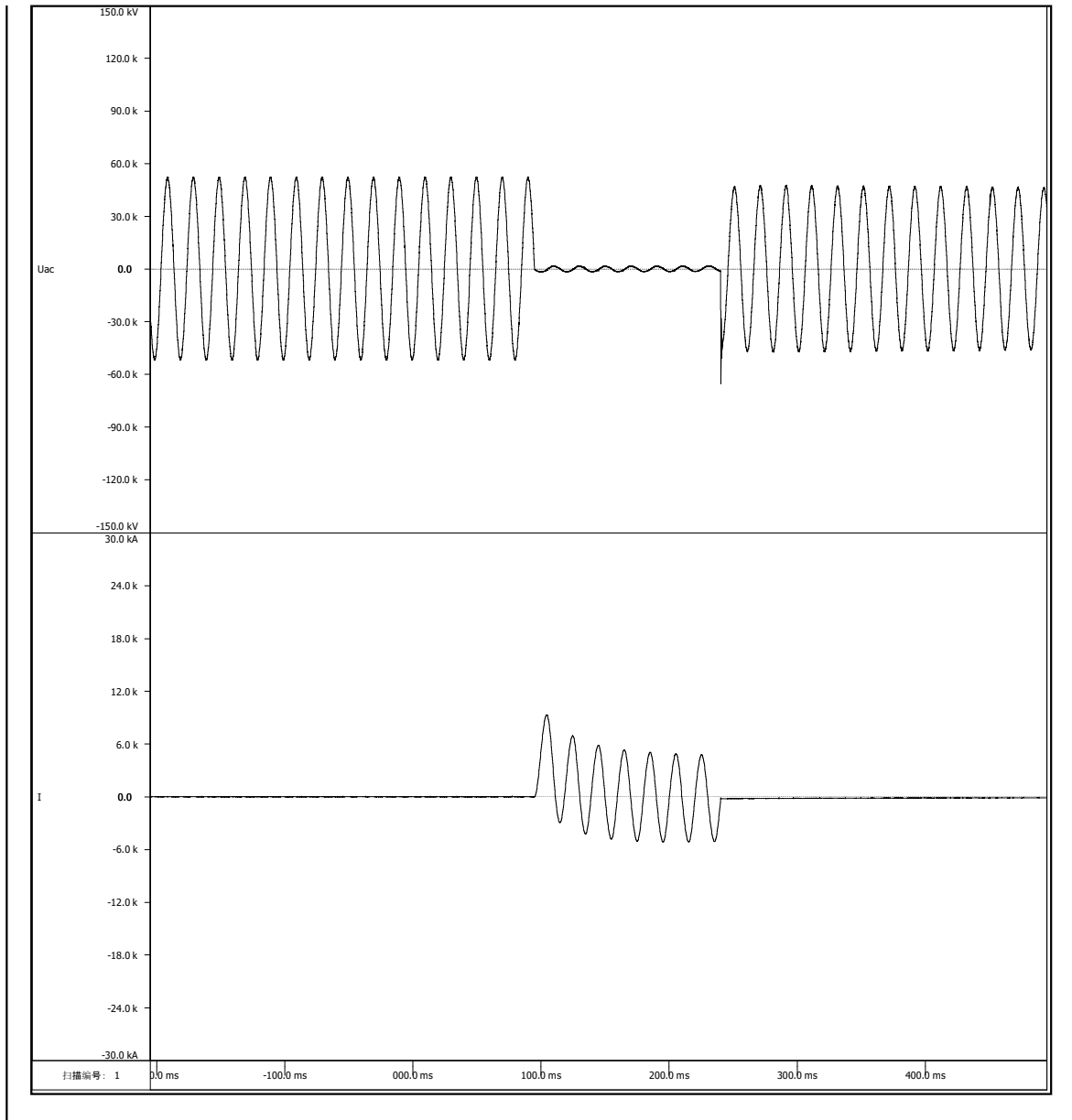
The prospective oscillogram of breaking test duty 1

No: /-Y001



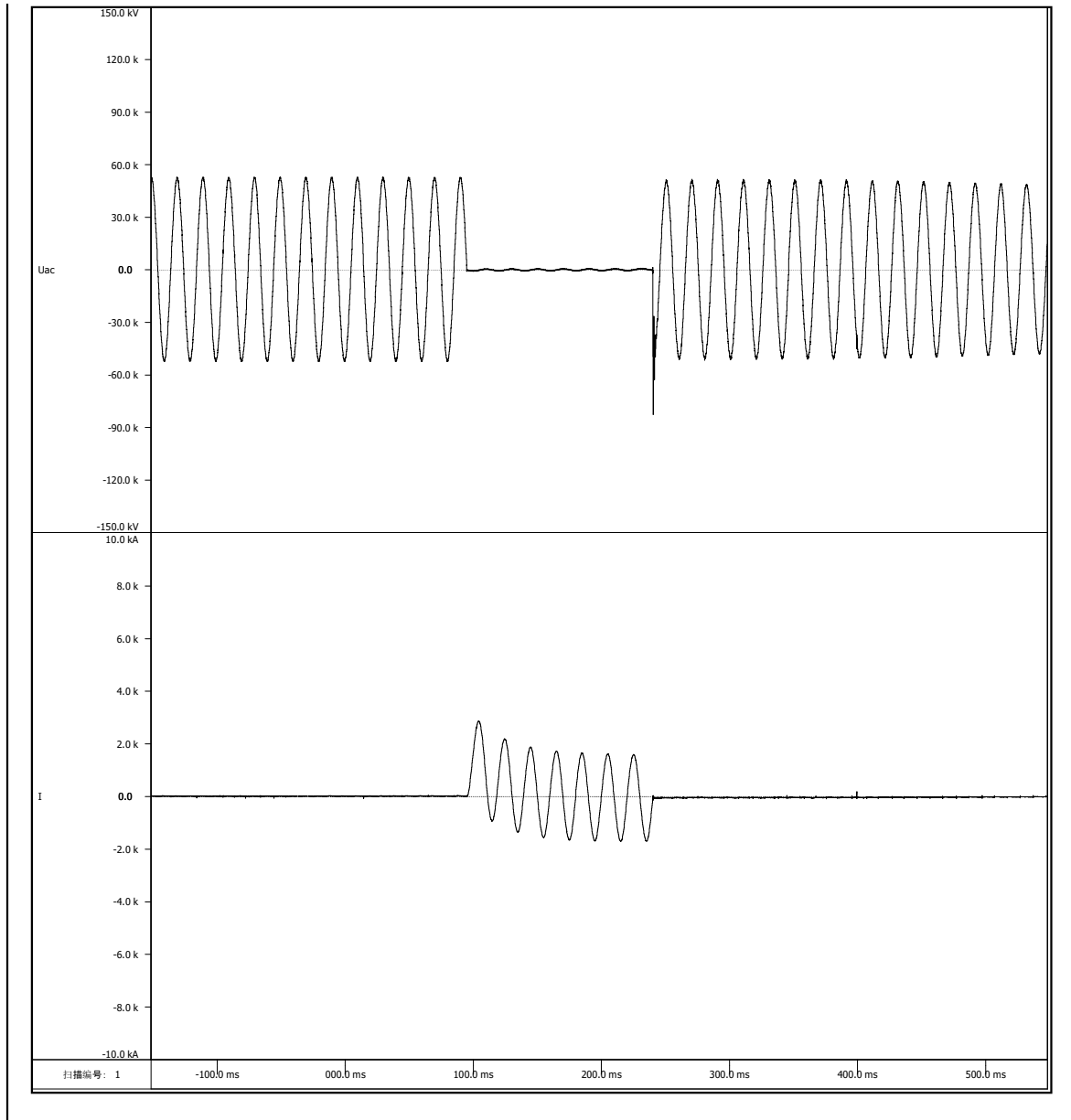
The prospective oscillogram of breaking test duty 2

No: /-Y002



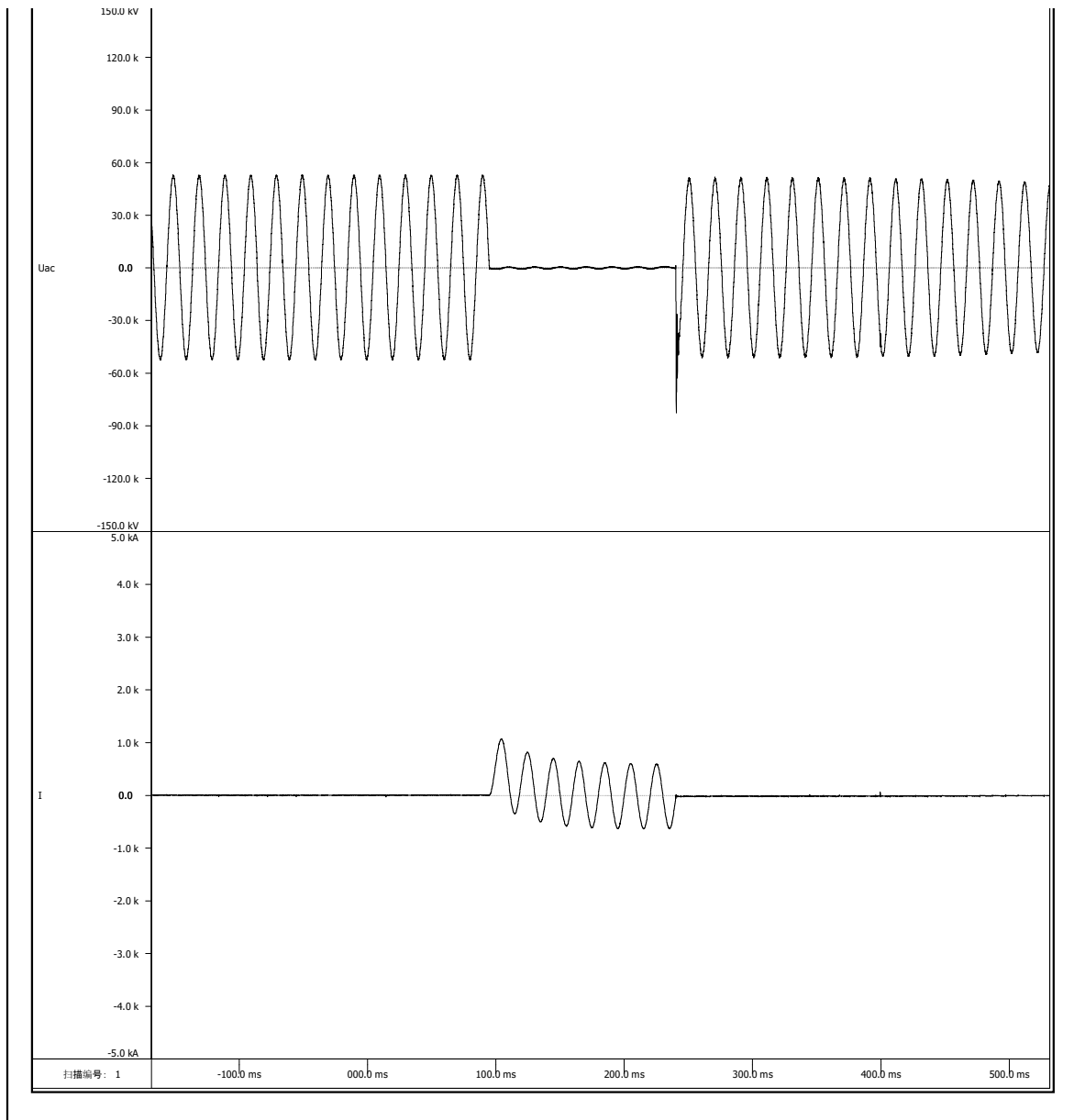
The prospective oscillogram of breaking test duty 3

No: /-Y003



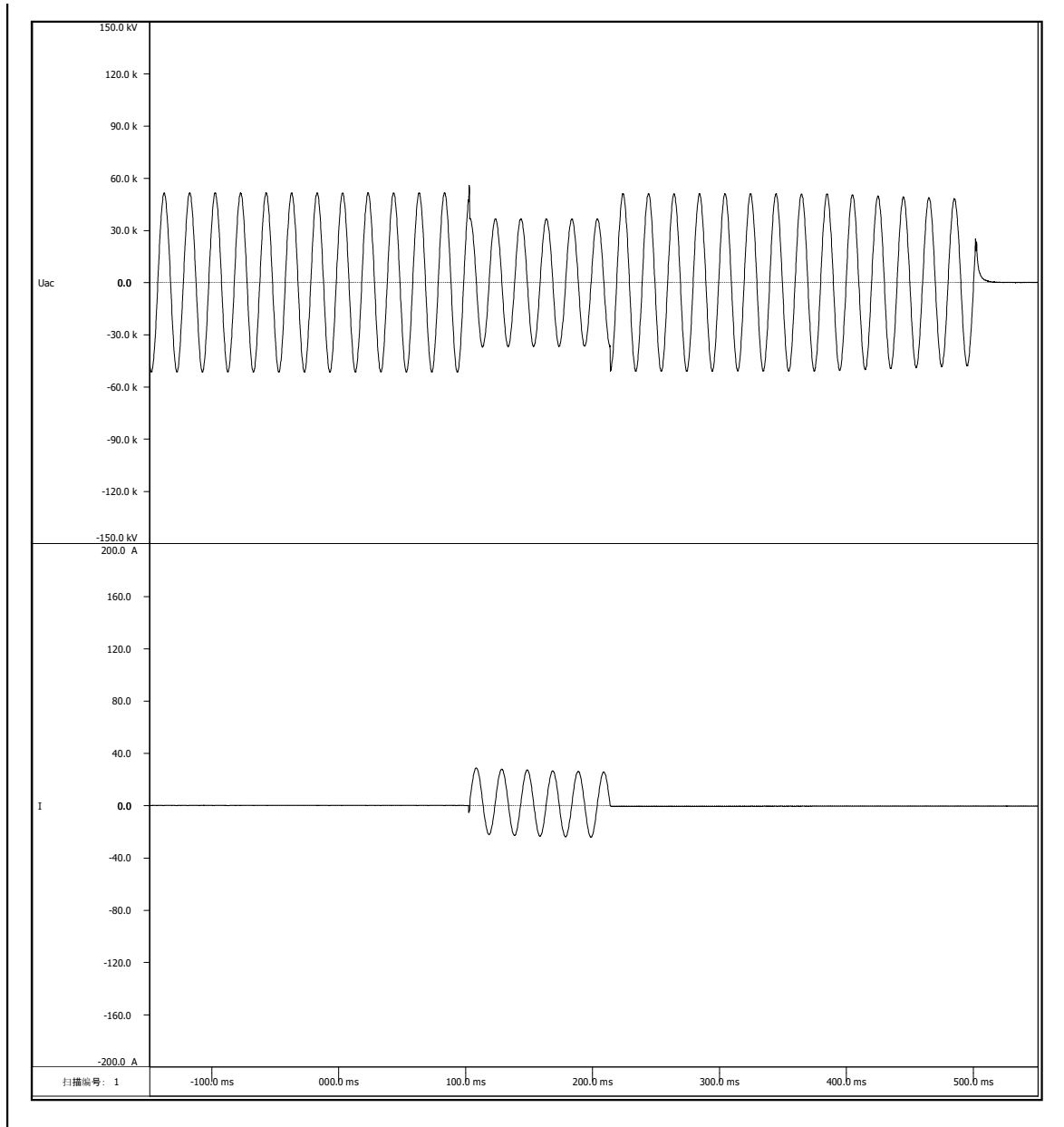
The prospective oscillogram of breaking test duty 4

No: /-Y004



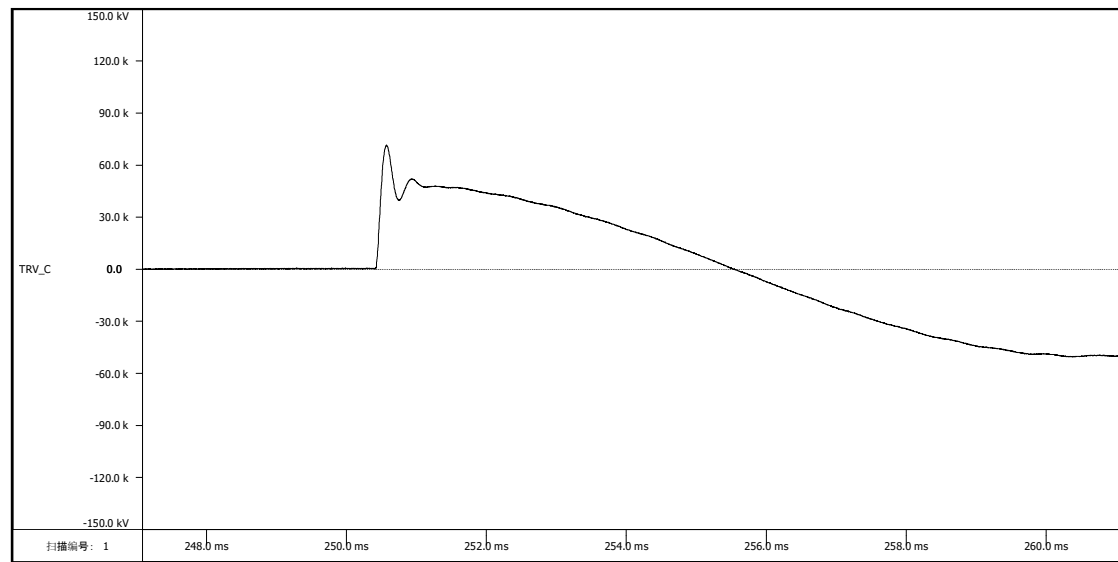
The prospective oscillogram of breaking test duty 5

No: /-Y005



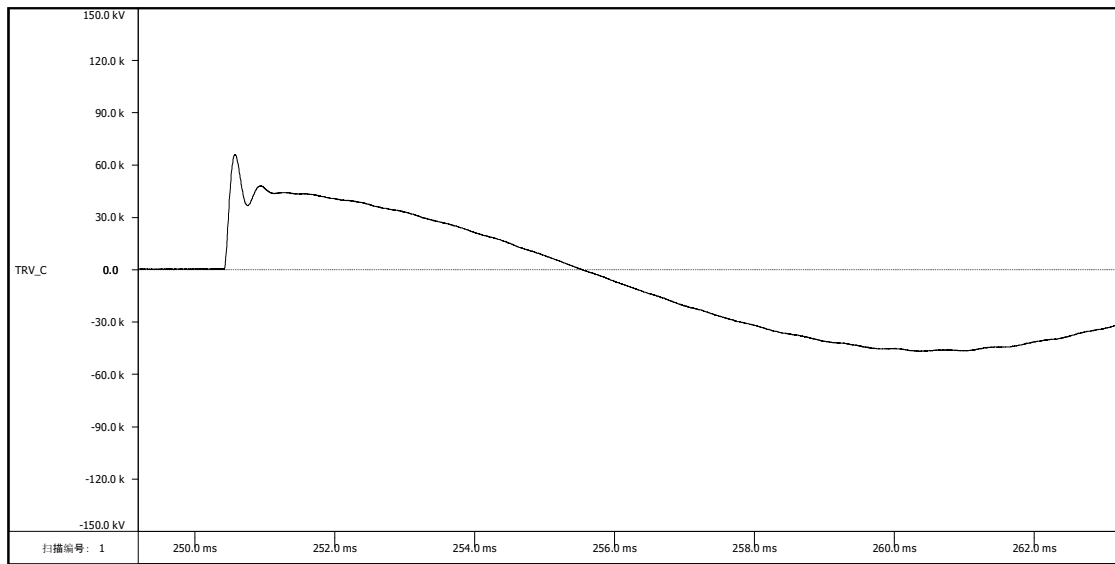
TRV of breaking test duty 1

No: /-TRV001, TRV001-1



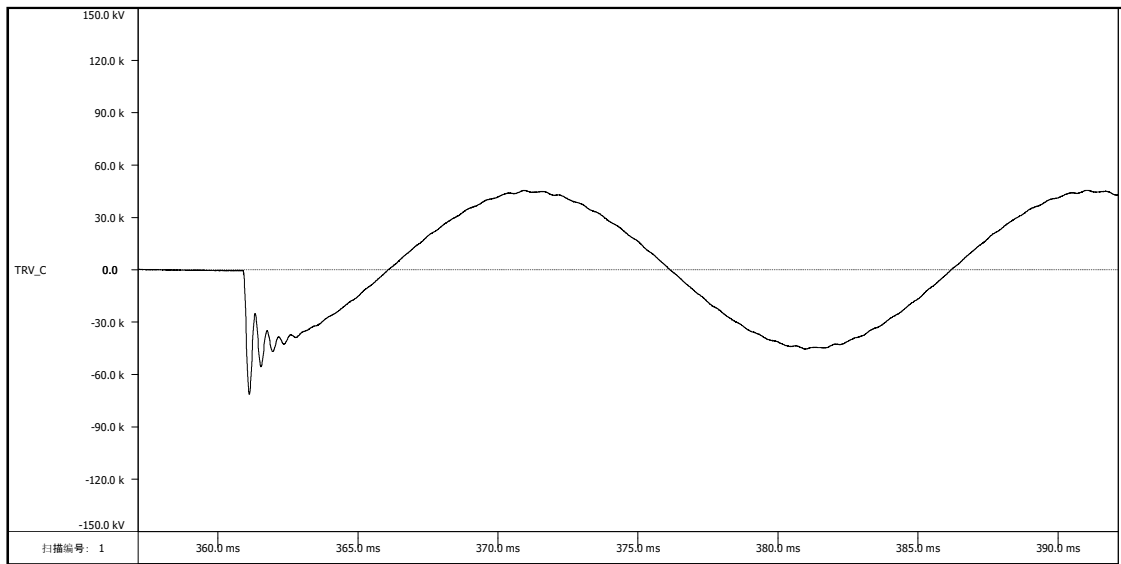
TRV of breaking test duty 2

No: /-TRV002,TRV002-1



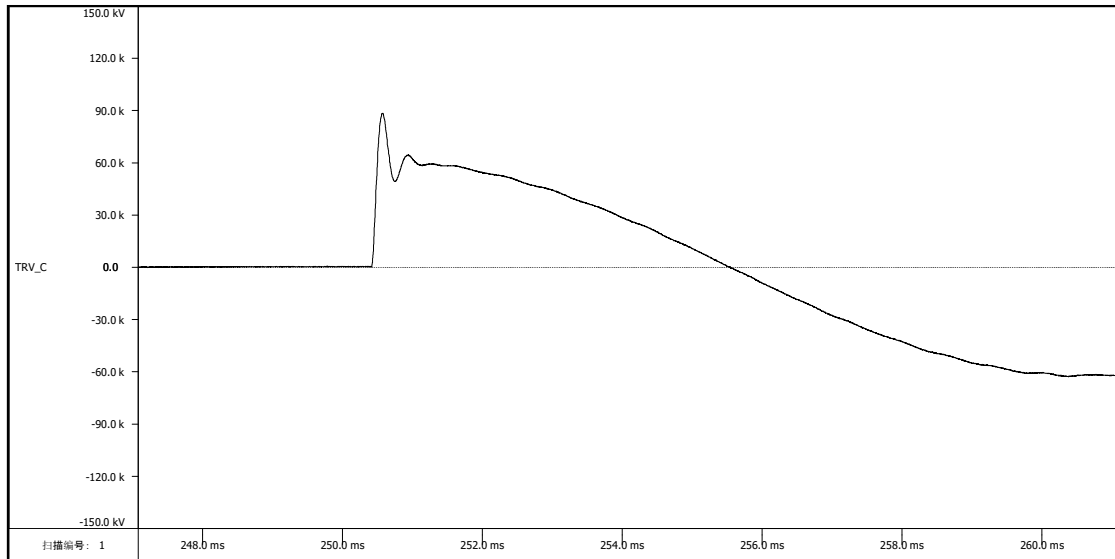
TRV of breaking test duty 3

No: /-TRV003,TRV003-1



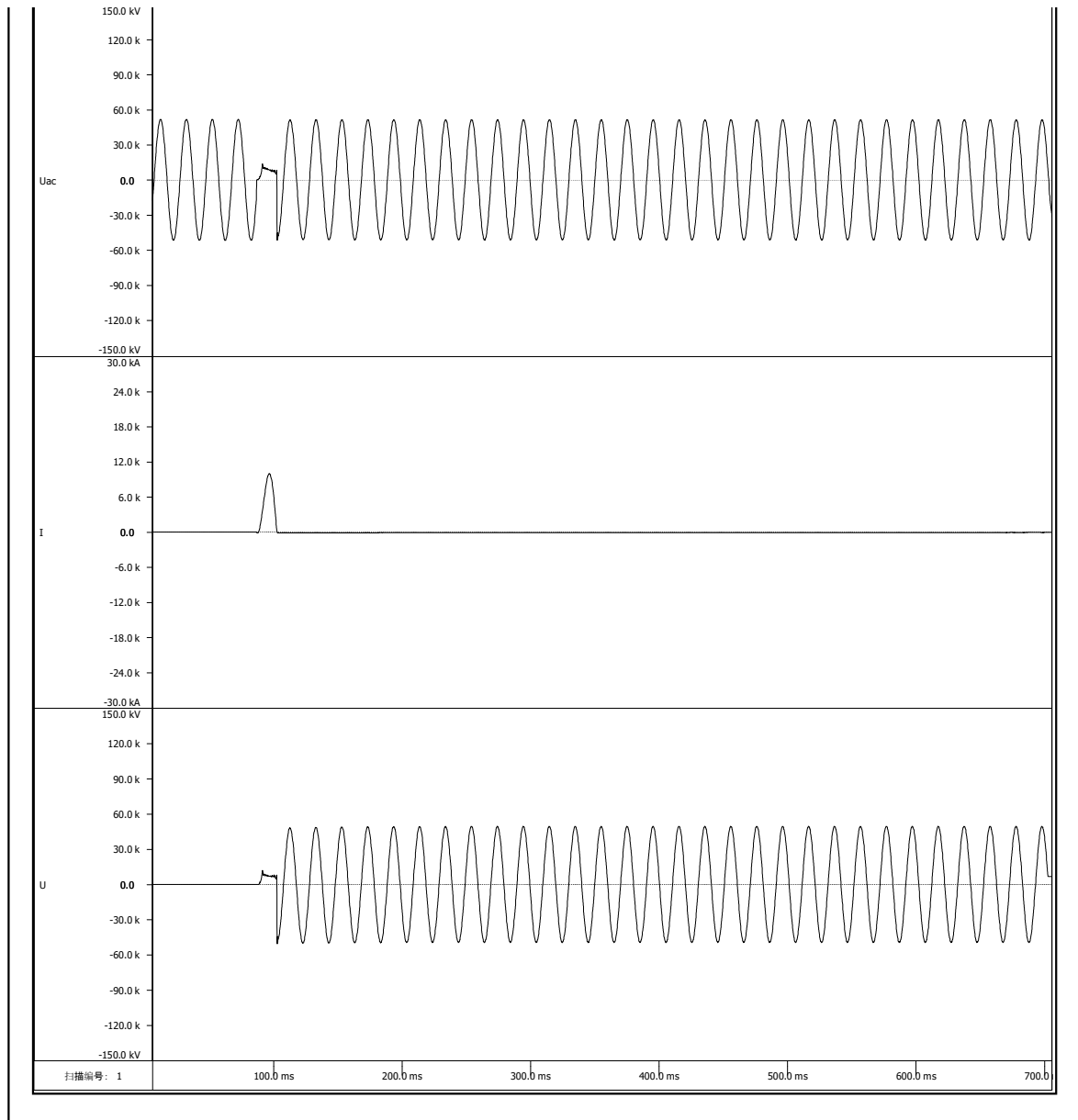
TRV of breaking test duty 4

No: /-TRV004,TRV004-1



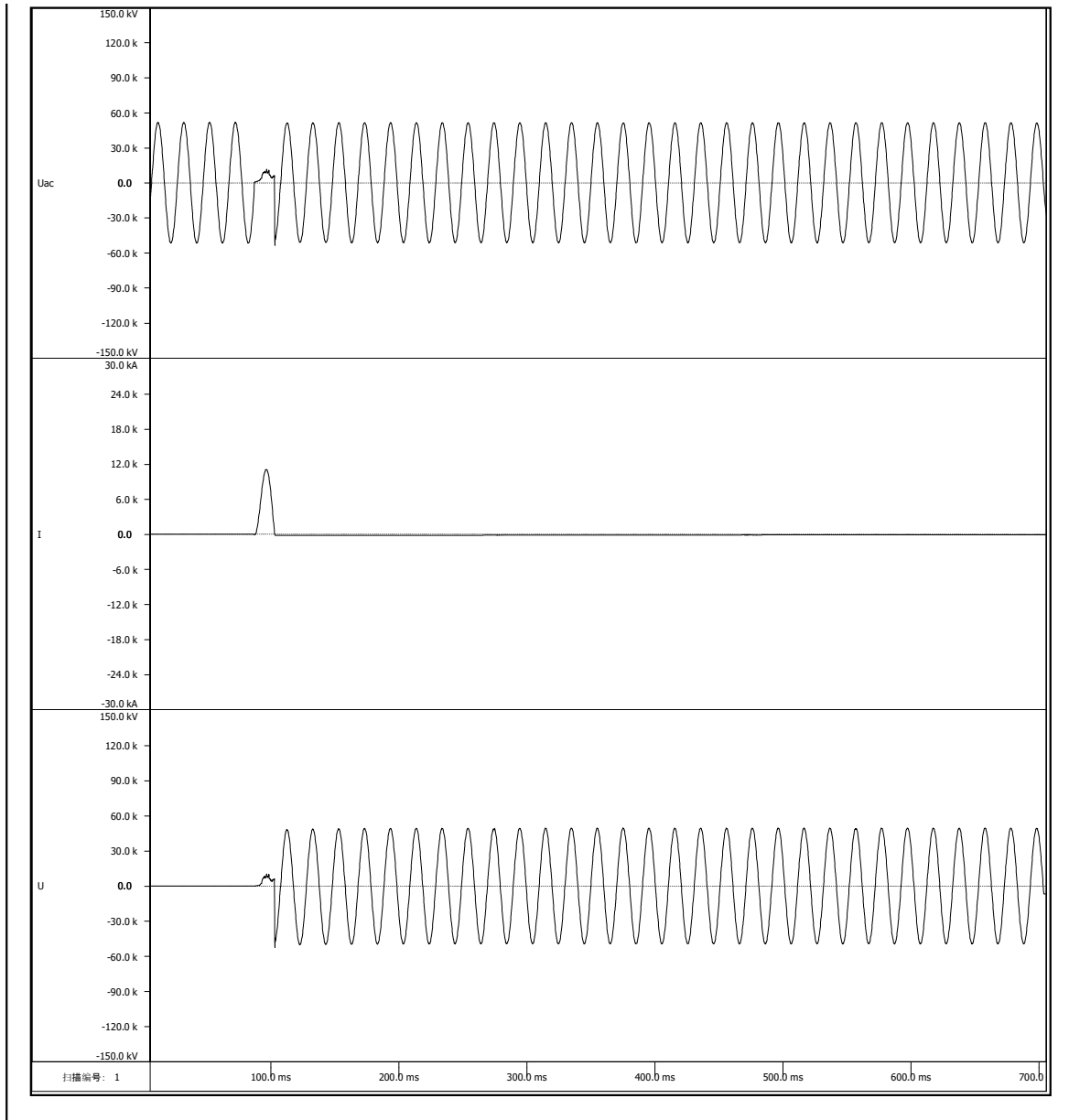
Oscillogram of breaking test duty 1

No: /-T001



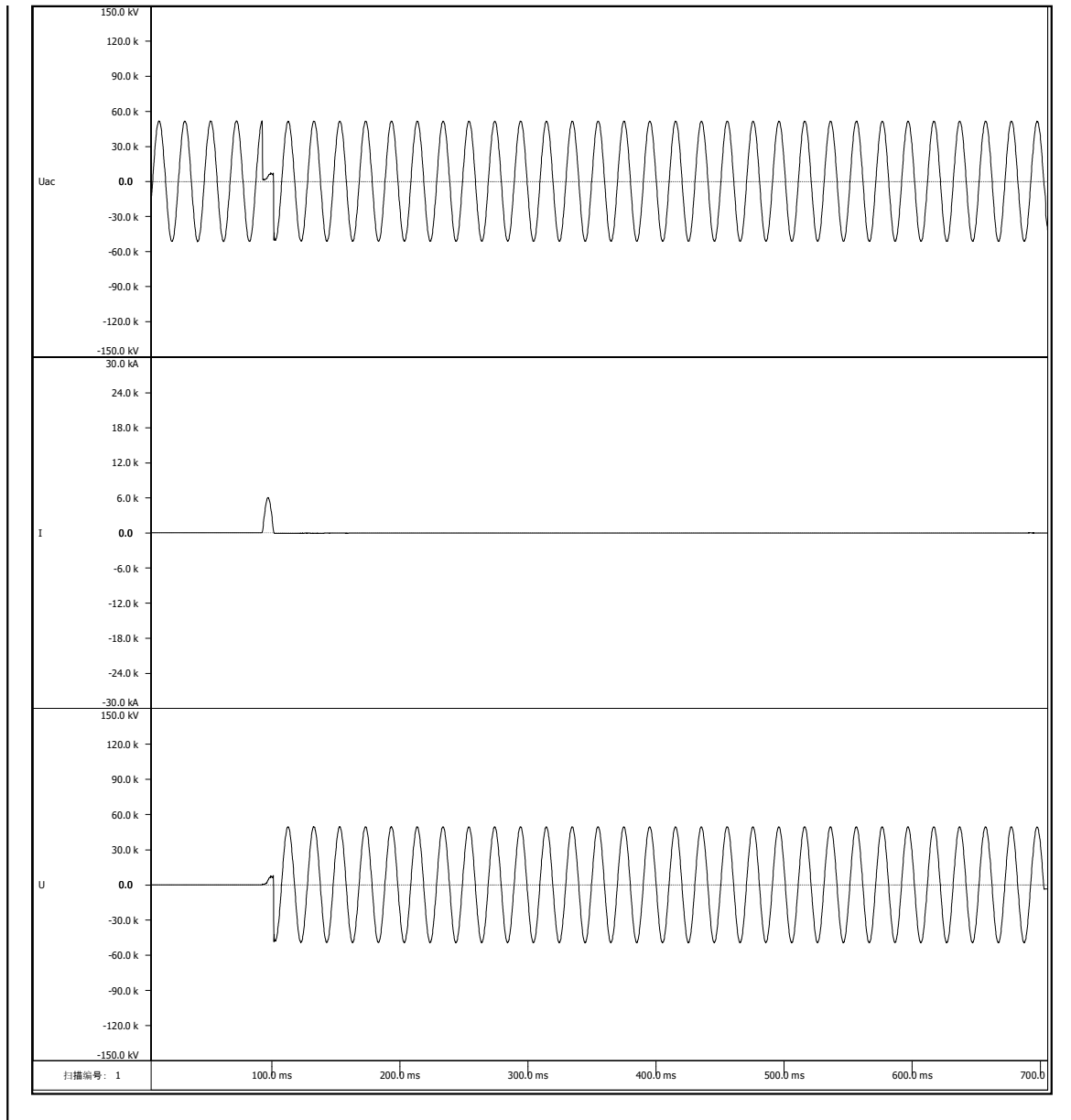
Oscillogram of breaking test duty 1

No: /-T002



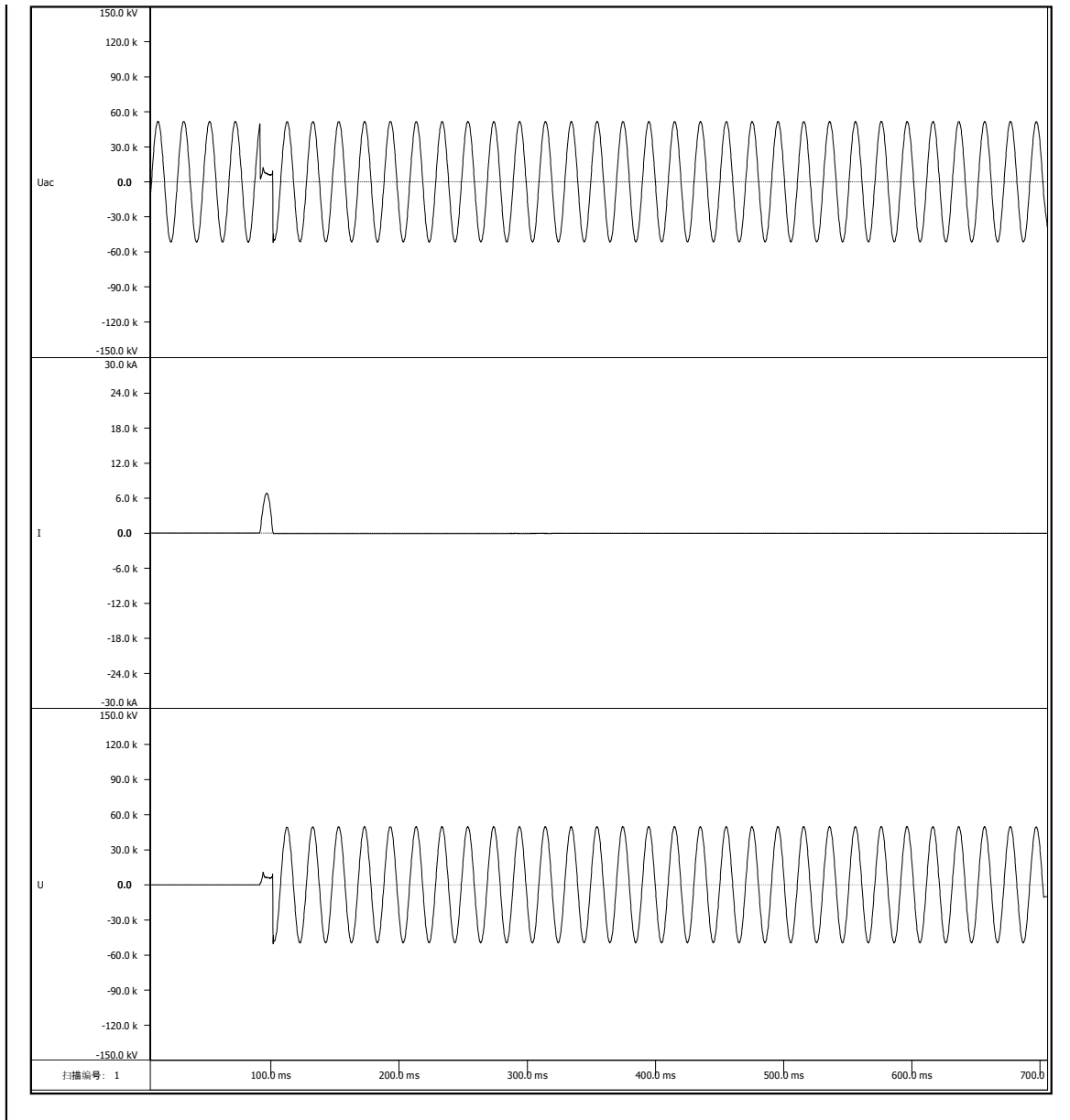
Oscillogram of breaking test duty 1

No: /-T003



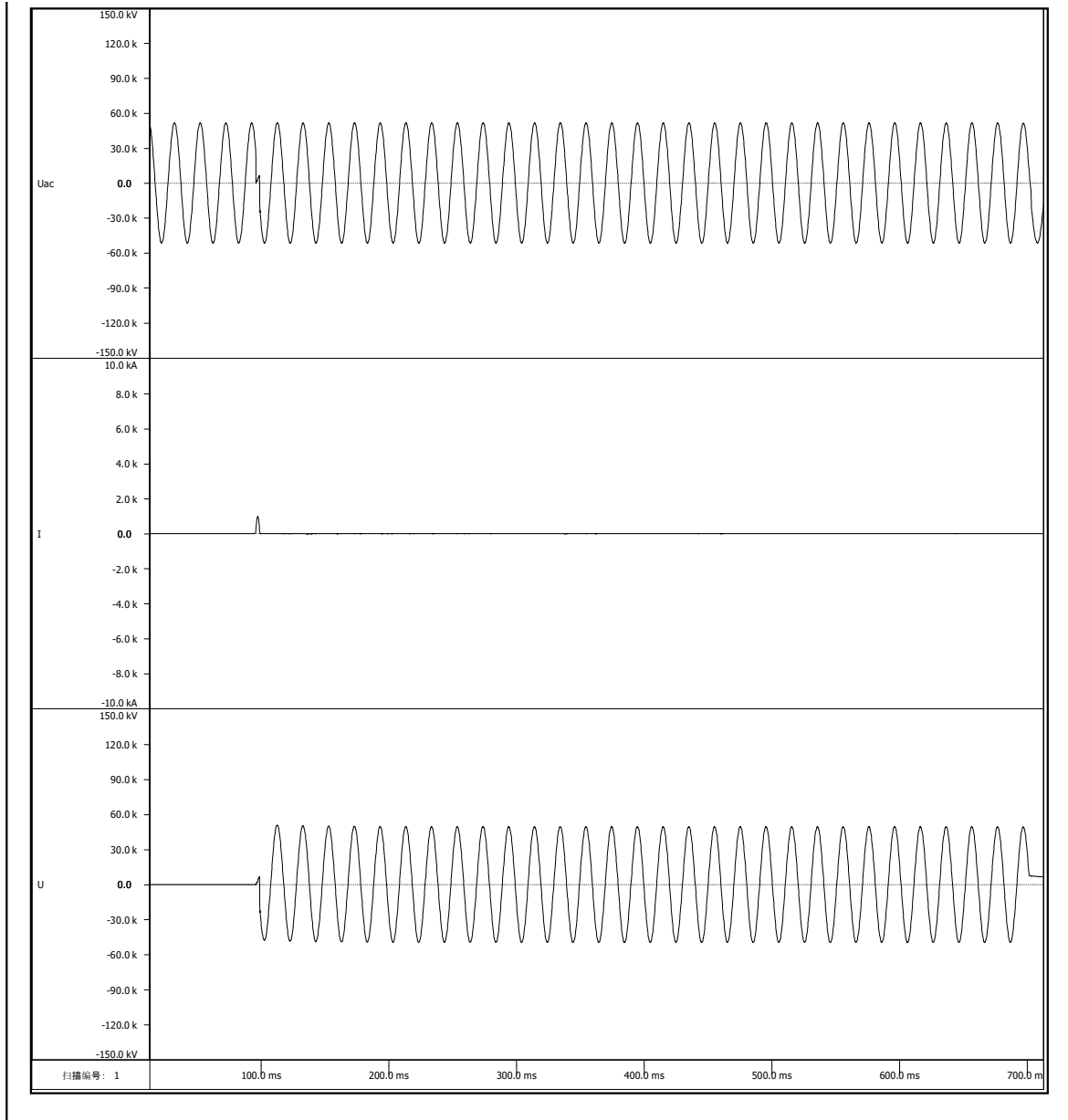
Oscillogram of breaking test duty 1

No: /-T004



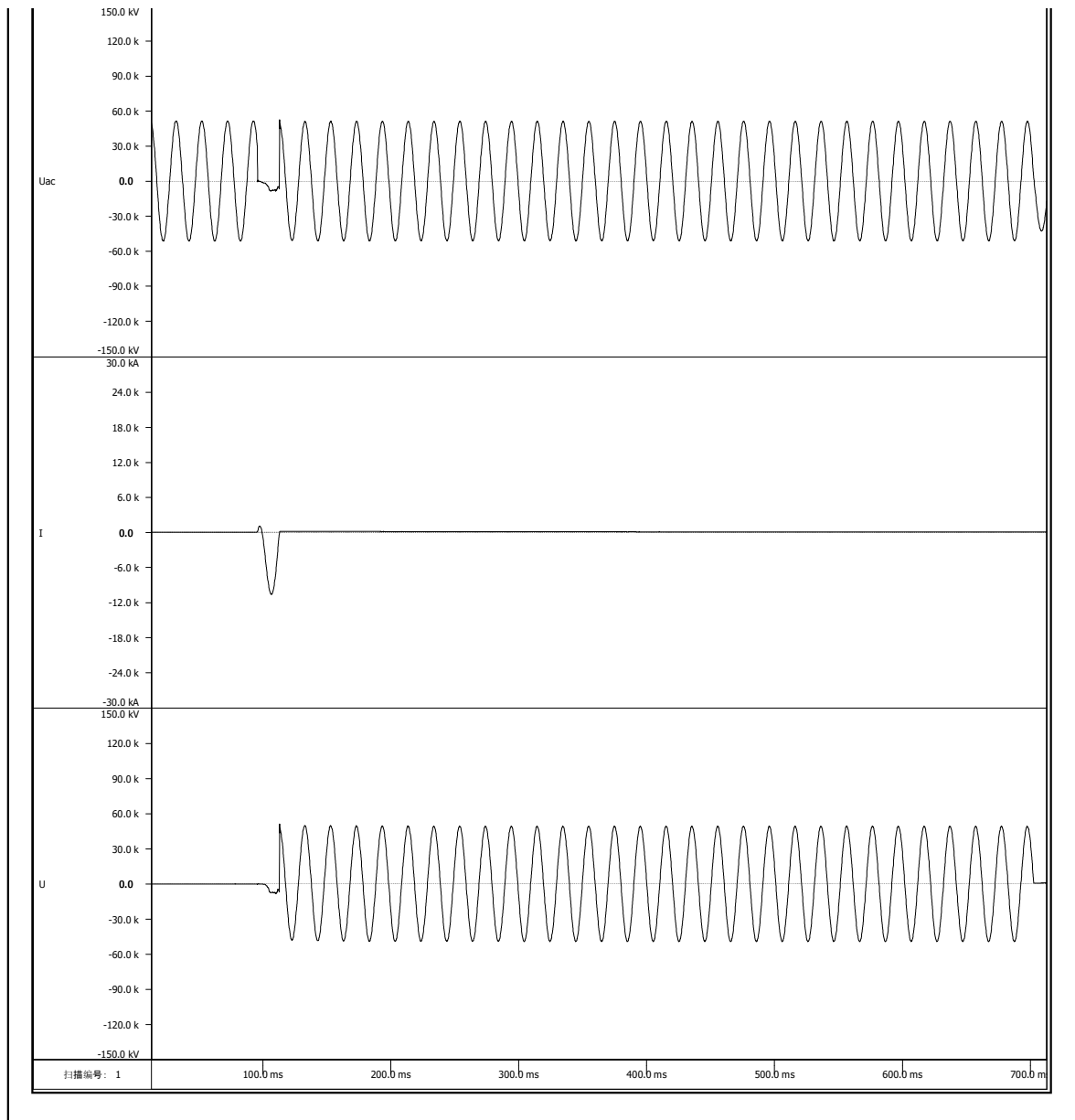
Oscillogram of breaking test duty 1

No: /-T005



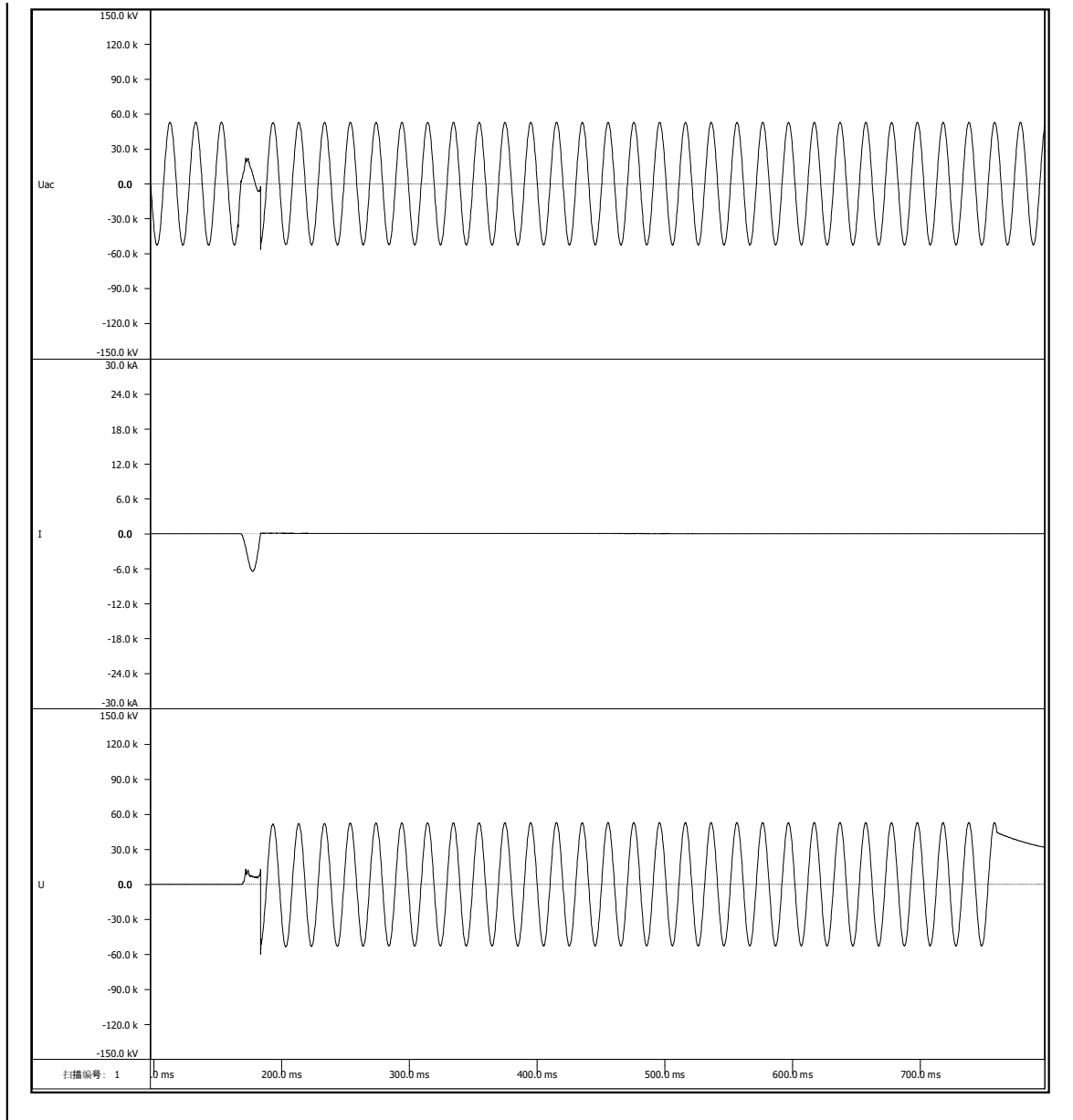
Oscillogram of breaking test duty 1

No: /-T006



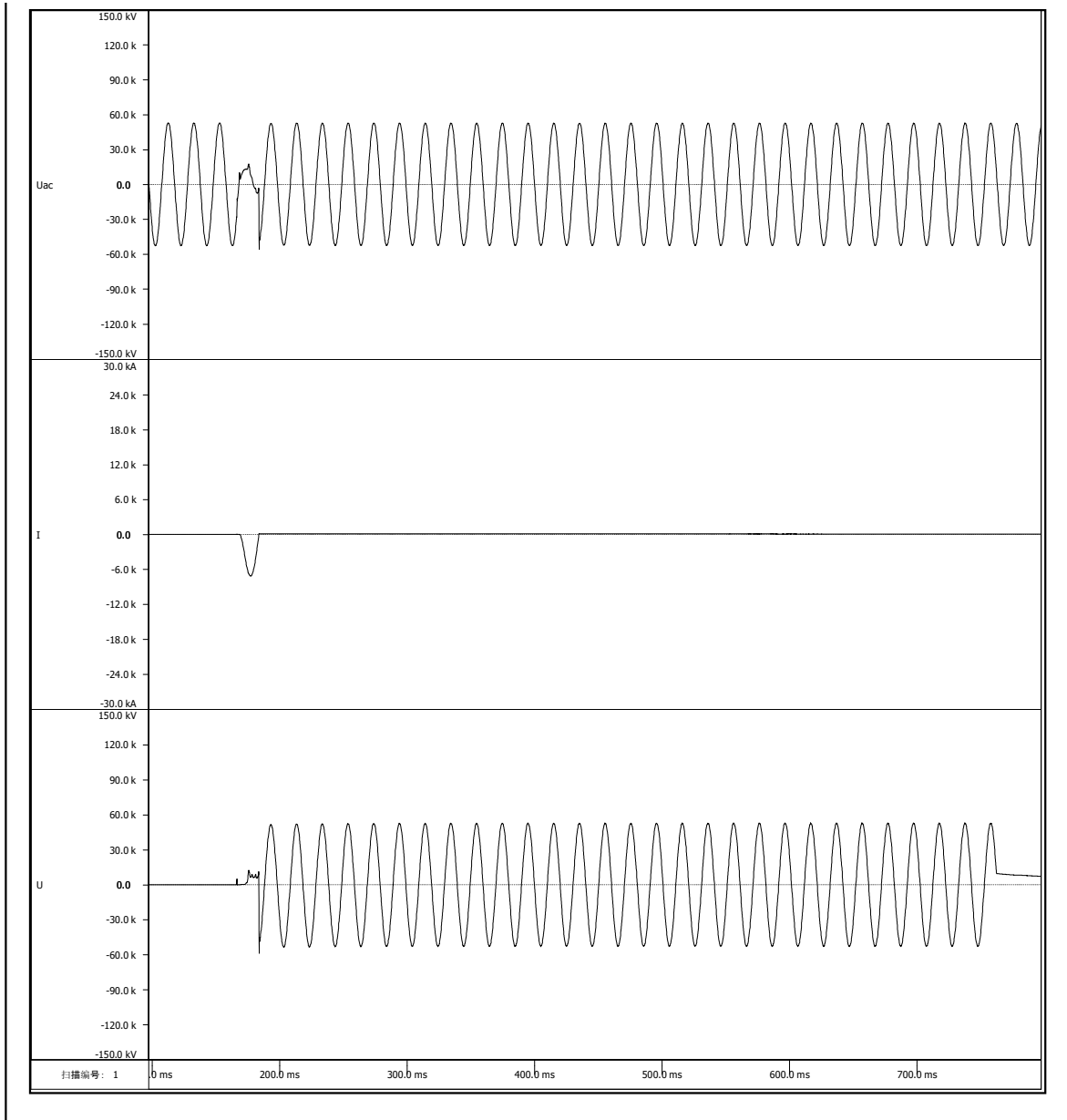
Oscillogram of breaking test duty 2

No: /-T007



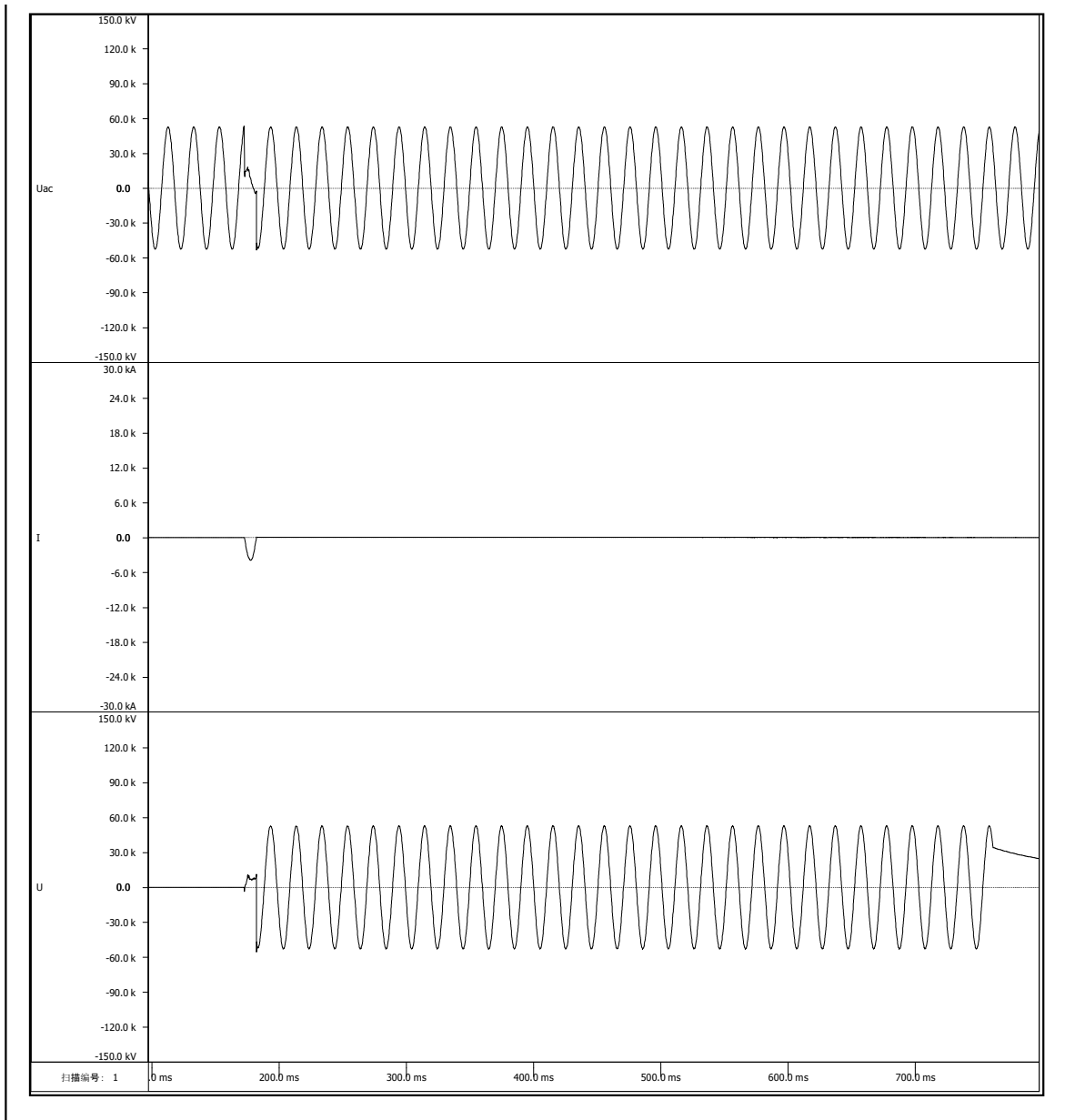
Oscillogram of breaking test duty 2

No: /-T008



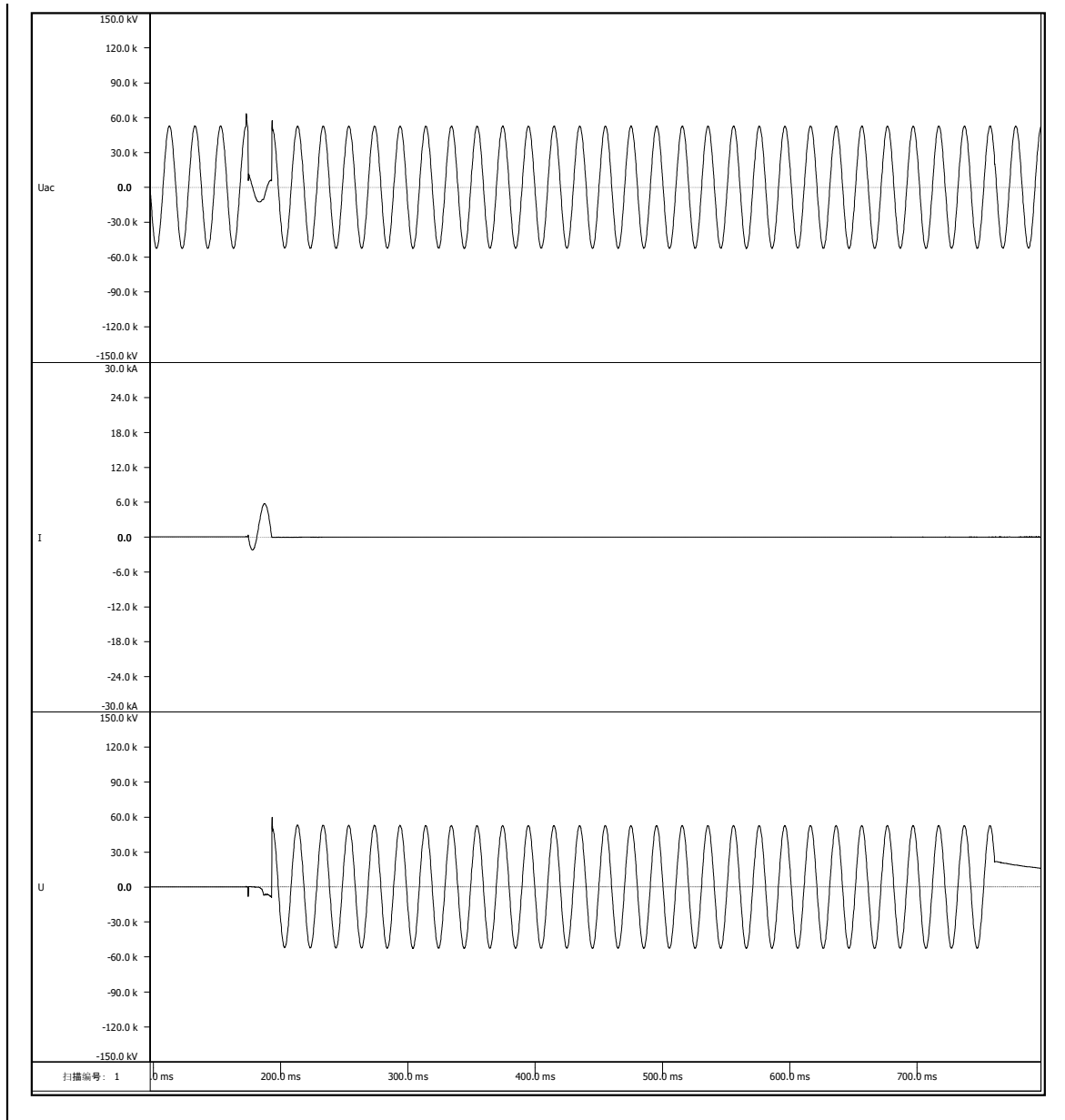
Oscillogram of breaking test duty 2

No: /-T009



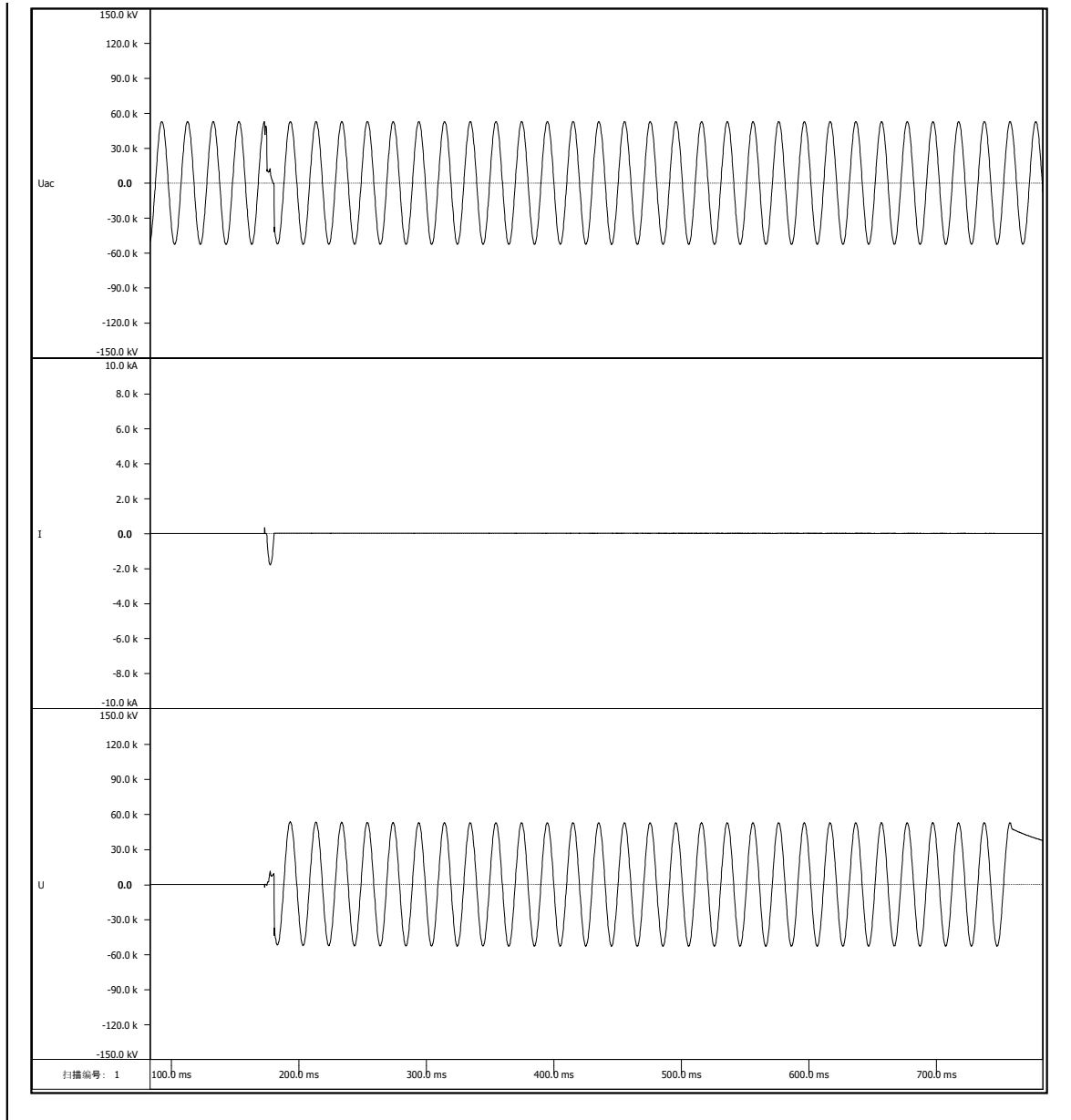
Oscillogram of breaking test duty 2

No: /-T010



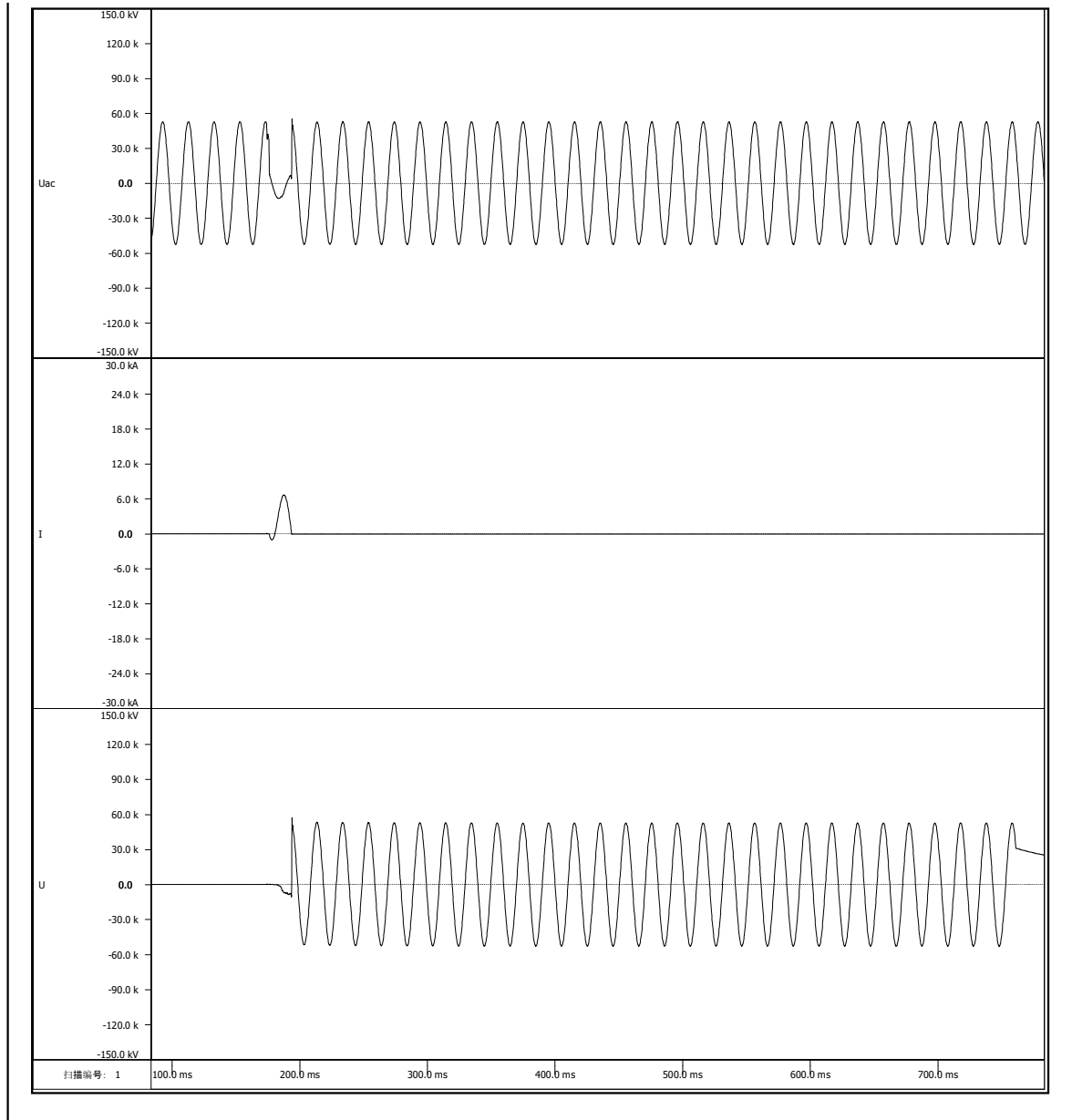
Oscillogram of breaking test duty 2

No: /-T011



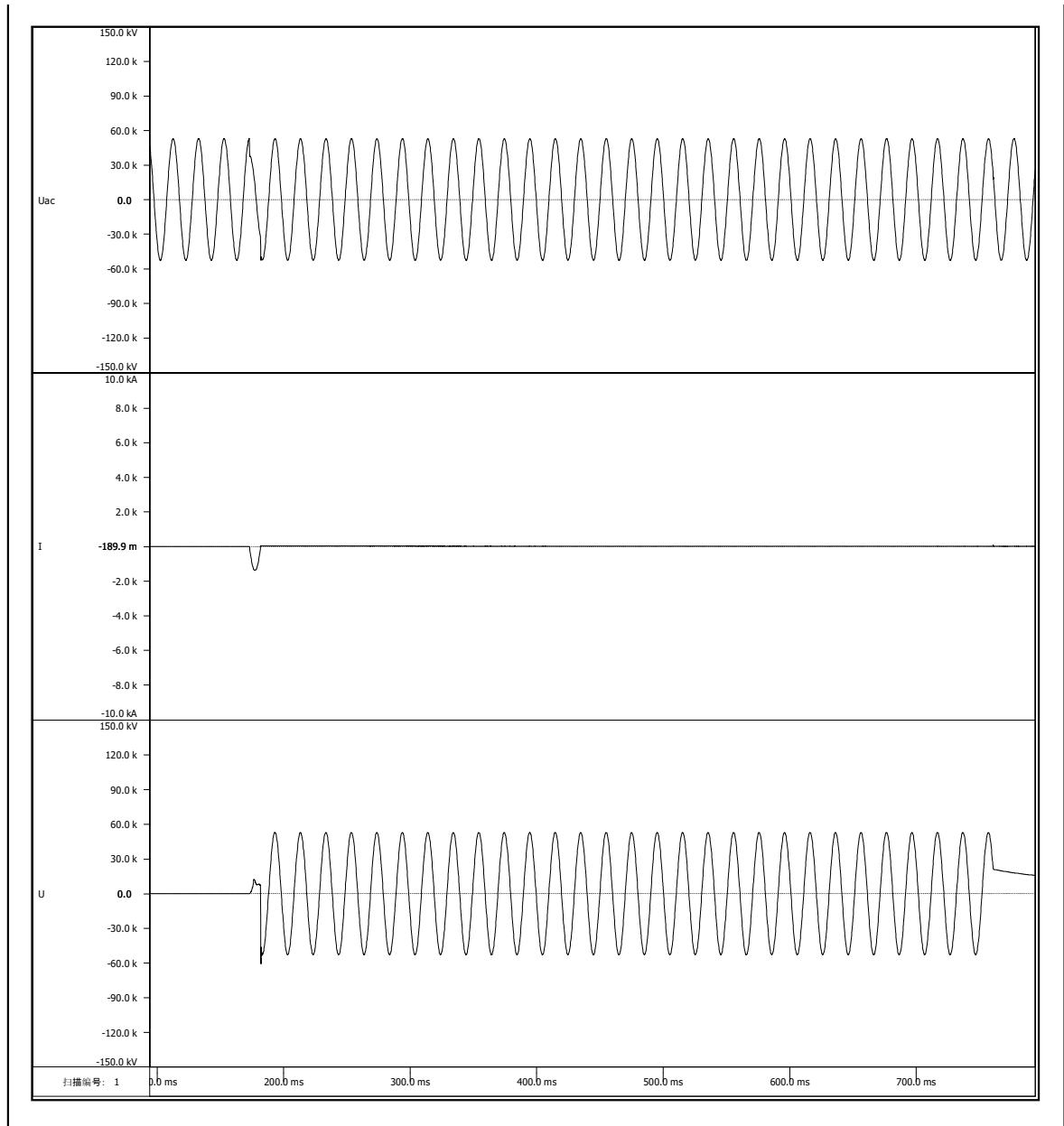
Oscillogram of breaking test duty 2

No: /-T012



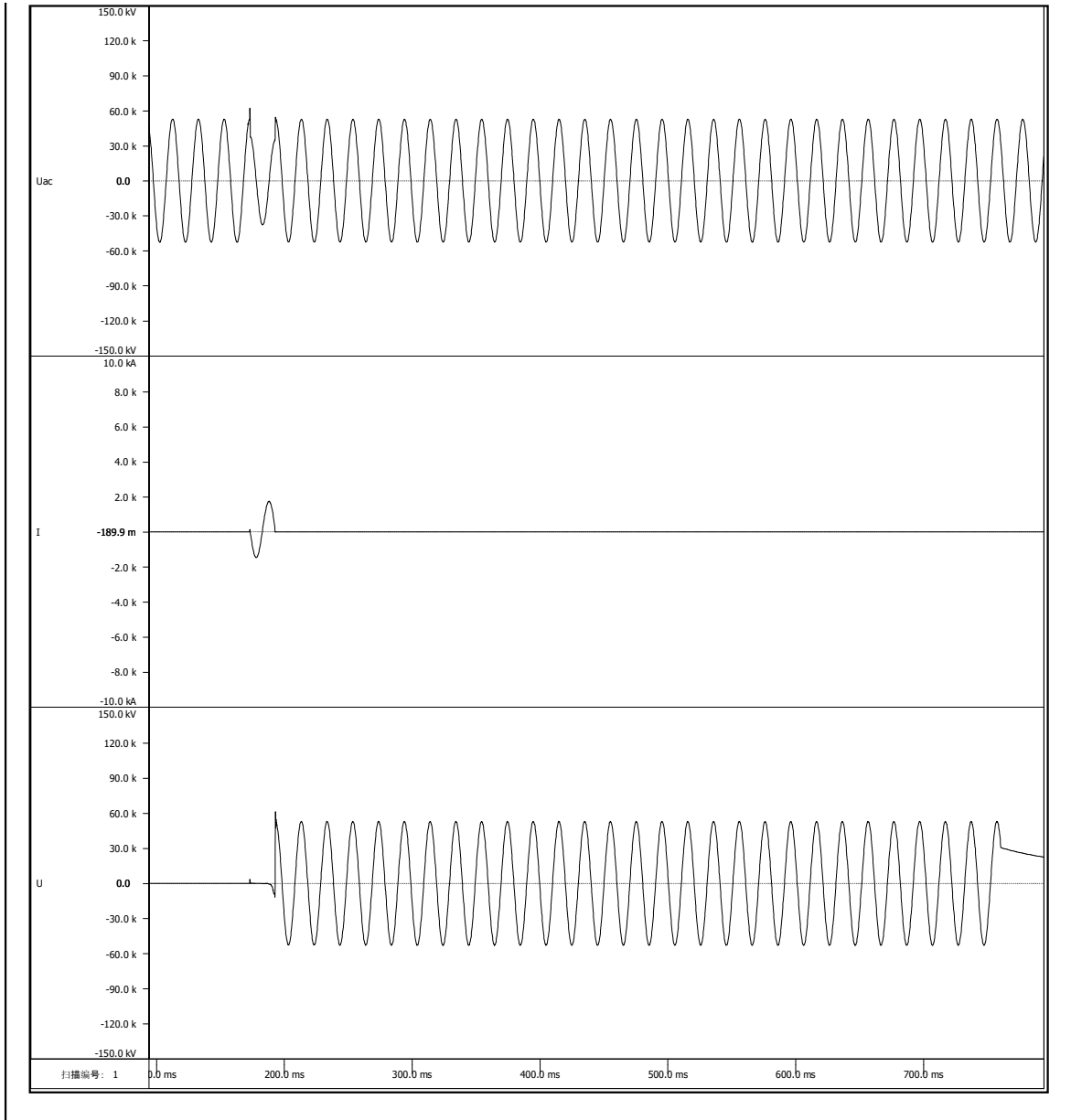
Oscillogram of breaking test duty 3

No: /-T013



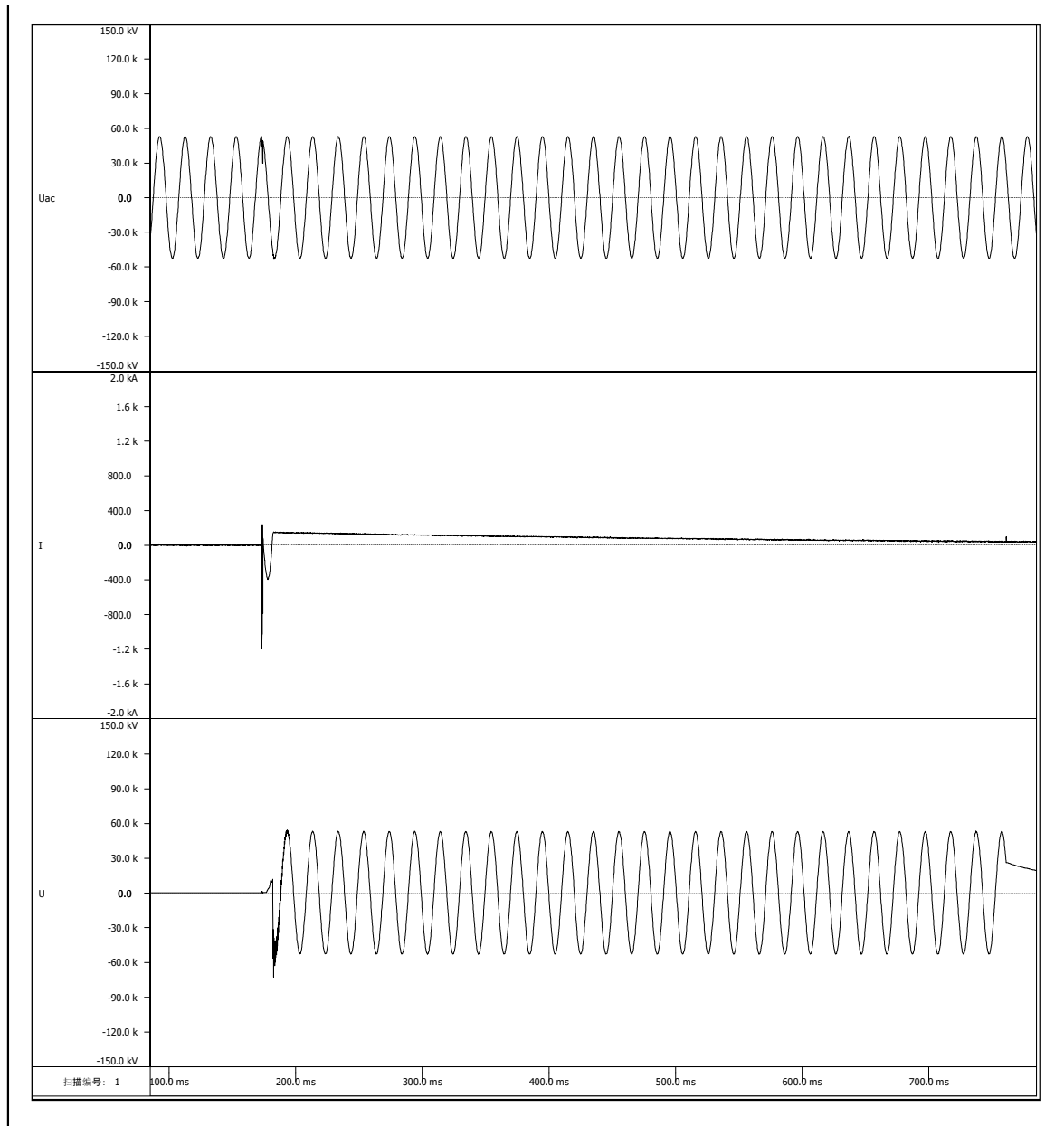
Oscillogram of breaking test duty 3

No: /-T014



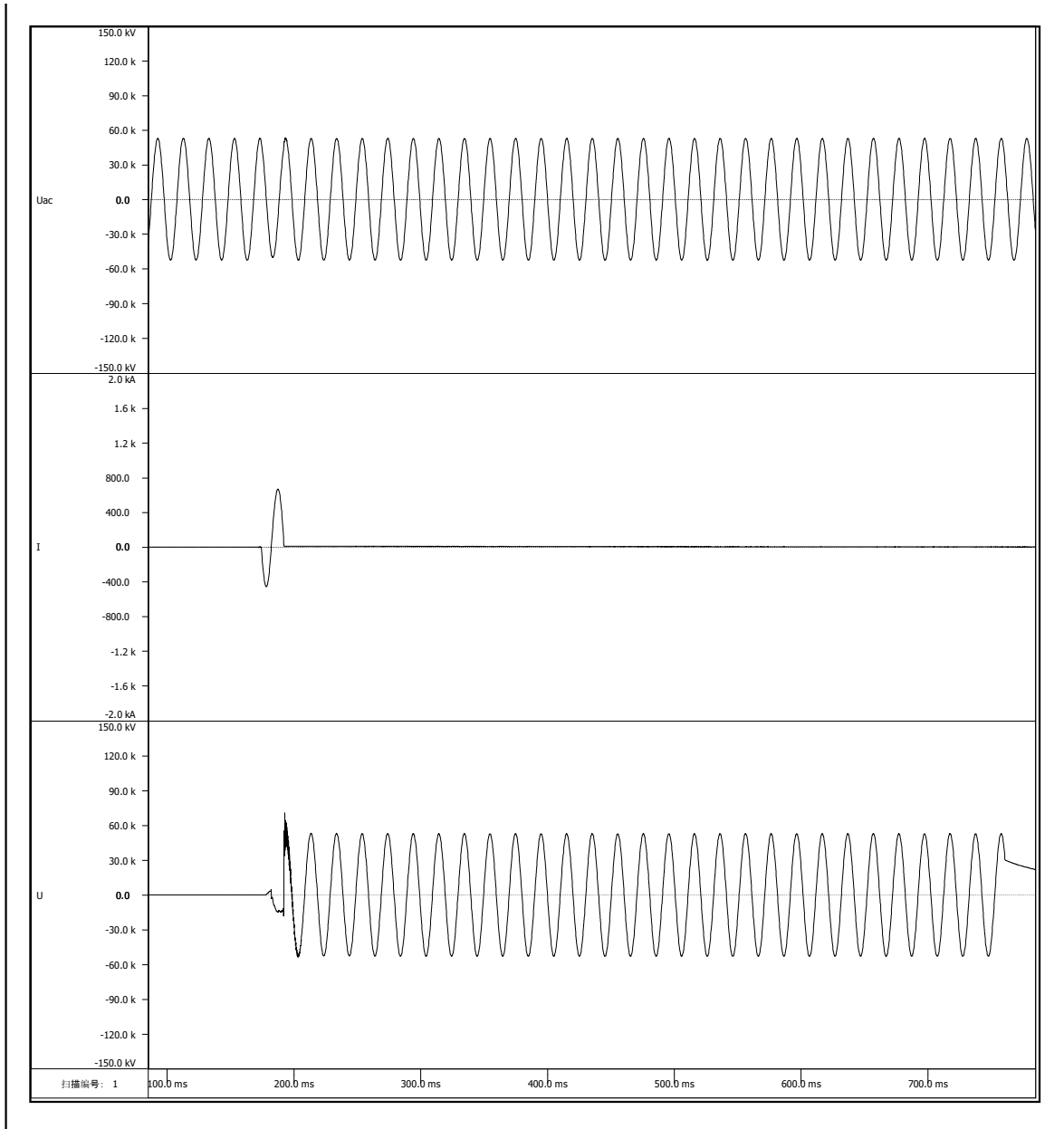
Oscillogram of breaking test duty 4

No: /-T015



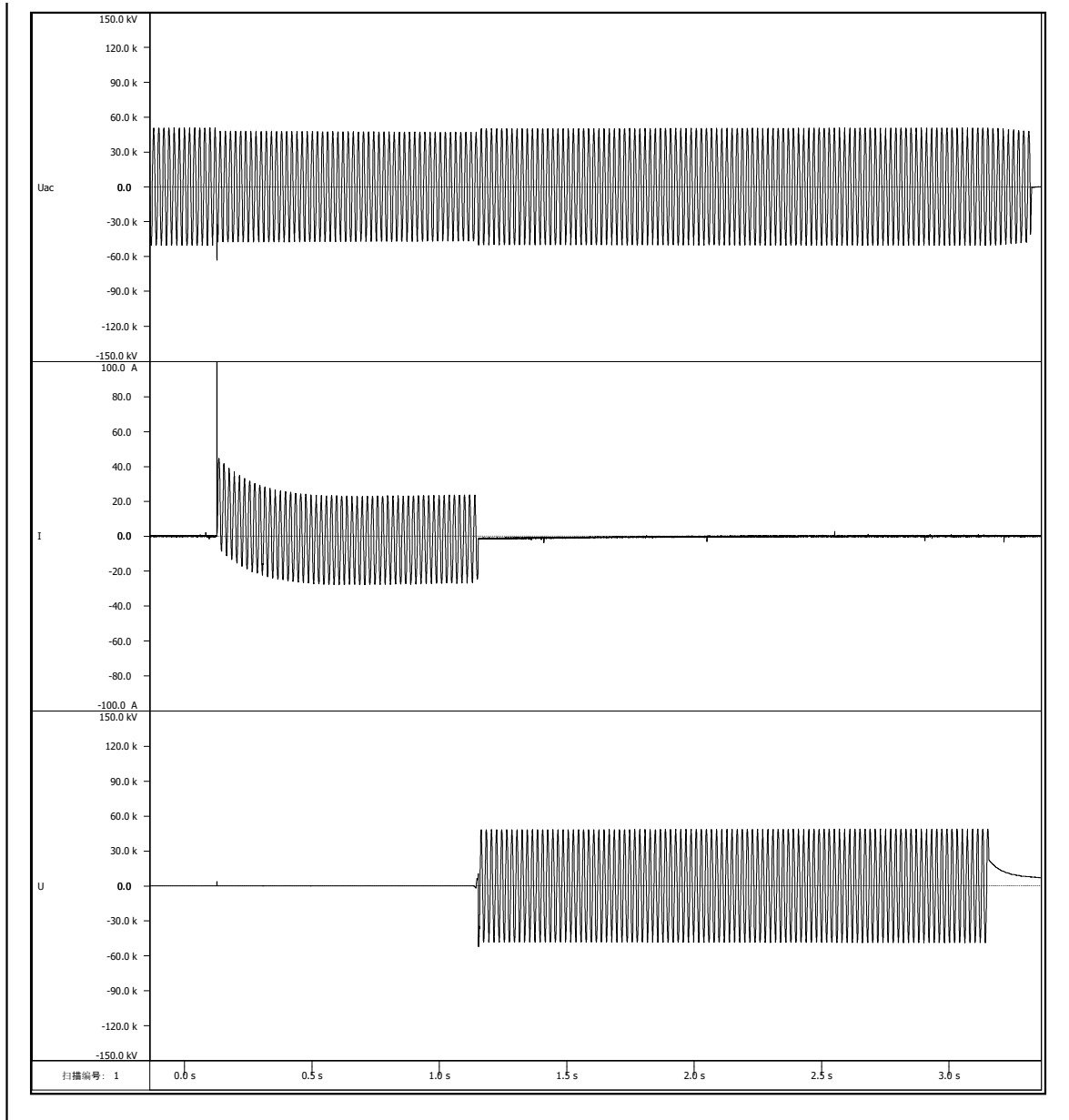
Oscillogram of breaking test duty 4

No: /-T016



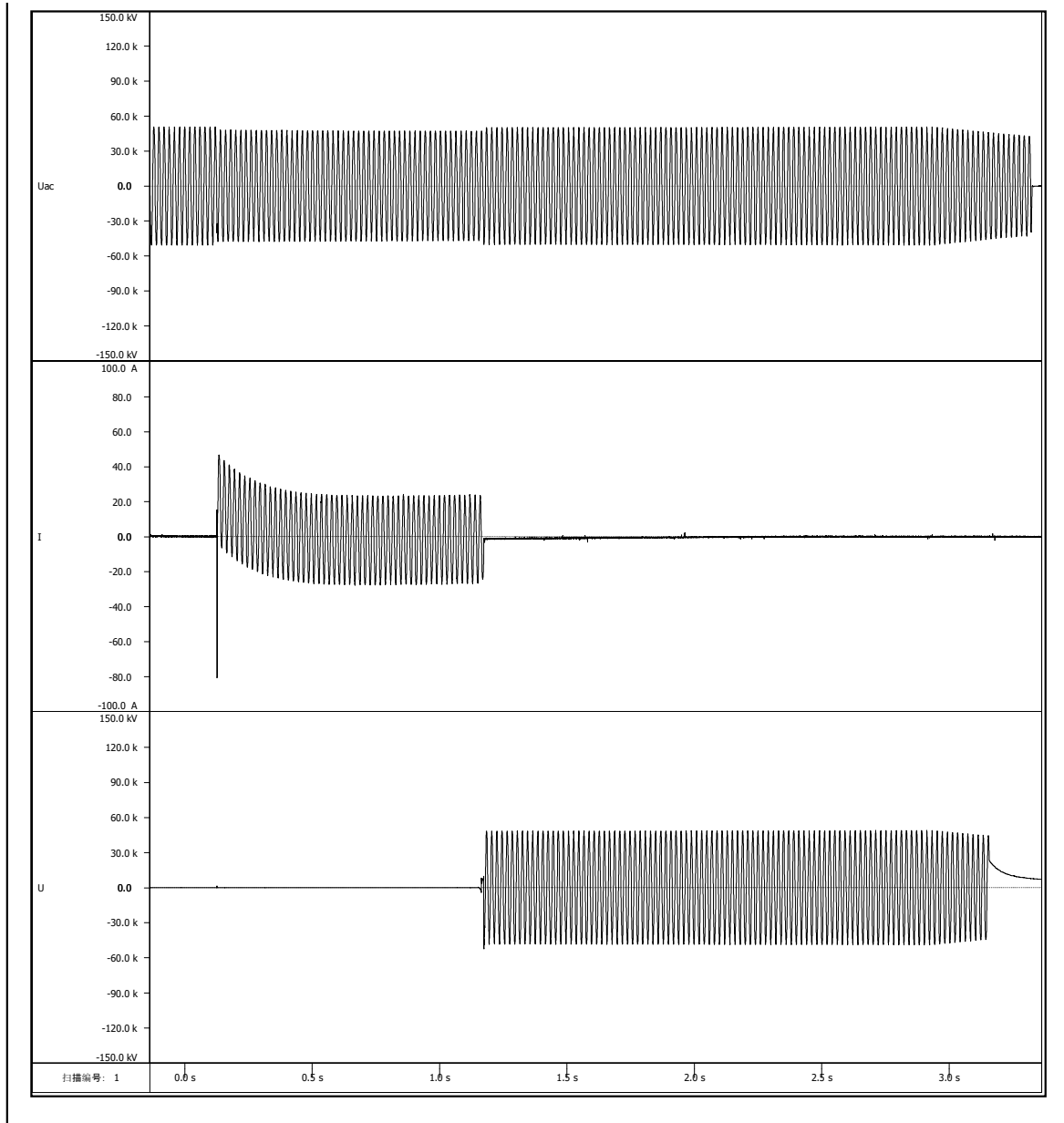
Oscillogram of breaking test duty 5

No: /-T017



Oscillogram of breaking test duty 5

No: /-T018



POLIPAR	Test Report	FUSE CUT-OUT
Mechanical tests		
Test date: June.12, 2022		
<p>1. Mechanical testing of fuse bases and fuse-carrying parts</p> <p style="padding-left: 40px;">The three fuses are closed and opened 500 times each.</p> <p style="padding-left: 40px;">At the end of the operation, the fuse was in an operable condition without any damage to the insulator or mechanical properties.</p>		
Test date: June. 12, 2022		
<p>2. Mechanical strength of fused parts</p> <p>a) Static tension test:</p> <p style="padding-left: 40px;">Apply 125%*60N axial tension to five fuses gradually, without sudden movement.</p> <p style="padding-left: 40px;">No damage to the fused parts (e.g. broken, loose, dislodged connections, or significantly elongated components) was detected.</p>		
<p>Note: The test passed</p>		

POLIPAR	Test Report	FUSE CUT-OUT
Thermal cycle and torque tests		
Test date: June.8, 2022		
<p>Test Procedure:</p> <p>Each cycle consists of the following:</p> <ol style="list-style-type: none"> a. The fuse cutout samples were immersed in water for a minimum of 1h. Water temperature is from 5 to 35 °C. The depth of immersion provides a minium water level of 13mm above any porcelain cavity, filled or open, or any hardware. b. The fuse cutout samples were removed from water. The tempperature of the air surrounding the device is lowered from ambient romm temperature to -40°C at a rate controlled to prevent thermal shock. A temperature of -40°C to -50°C was maintained for a minimum of 2h. c. The temperature of the air surrounding the fuse was raised from -40°C to 60°C at a rate controlled to prevent thermal shock. A temperature of 60°C to 70°C was maintained for a minimum of 2h. The device shall be permitted to return to room temperature before reimmersing it in water for subsequent test cycles. 		
Test date: June. 10, 2022		
<p>Acceptance of criteria:</p> <p>There shall be no cracks in the insulator or loose hardware after above tests.</p>		
<p>Note: The fuse cutout samples are in good condition after above tests. Test passed.</p>		

POLIPAR	Test Report	FUSE CUT-OUT
Torque tests		
Test date: June.8, 2022		
<p>Test Procedure:</p> <p>Torque tests were performed on fuses that utilize threaded fasteners to attach the hardware to the insulator. Five new fuse cutouts were tested.</p>		
Test date: June.8, 2022		
<p>Acceptance of criteria:</p> <p>A torque of 125% of the nominal values specified by manufacturer POLIPAR should be applied to the threaded fasteners that attach the hardware to the insulators. The specified value by POLIPAR is 20kN, so 25kN torque was tested. The condition of the device after testing must be no damage to the insulators, thread failures, or loose components.</p>		
<p>Note: The fuse cutout samples are in good condition after above tests. The test passed.</p>		

POLIPAR		Test Report			FUSE CUT-OUT		
Radio interference voltage (r.i.v.) tests							
Test date: June. 10, 2022							
Sample condition	Voltage applied to	Earth connected to	Measurement frequency(MHz)	Test applied voltage (kV)	Measured interference level (dBm)	Radio interference level U (μV)	Maximum allowable interference level (μV)
Fuse in closed position	Aa	F	1	15.3	32.8	43.6	≤250
Fuse in opened position	A	aF	1	15.3	33.3	46.1	≤250
	a	AF	1	15.3	33.5	47.2	≤250
<p>Condition of test object before test: The test sample is working properly.</p> <p>Note: A——one side terminal of tested parts; a——the other side terminal of tested parts; F——enclosure and base.</p> <p>The data in the table has been corrected into the standard atmospheric conditions.</p>							
Atmospheric conditions of test zone	P= 102.5kPa; Ambient temperature t= 26°C; Relative humidity: 65% Atmospheric correction factor Kt= / Altitude correction factor Ka= /						

POLIPAR	Test Report	FUSE CUT-OUT
Measurement of Resistance of fuse-links is for resistance test		
Test date: June.10, 2022		
Test Procedure: Applied 100A current, check the resistance values		
Acceptance of criteria: the resistance measurement value is no later than 2000 $\mu\Omega$ specified by manufacturer		
Samples	Test datas	Test Result
#1	125 $\mu\Omega$	Passed
#2	123 $\mu\Omega$	Passed
#3	118 $\mu\Omega$	Passed
#4	113 $\mu\Omega$	Passed
#5	119 $\mu\Omega$	Passed
#6	127 $\mu\Omega$	Passed