



Test Report

Report No.: XZ 289 F 005

Copy No.: 1

Contents: 24 Sheets

Test object: Metal-enclosed, oil-insulated switchgear equipped with three-position switch disconnecter.

Designation: Ring Main Unit Type T4GF3
Rated voltage: 7.2 / 12 kV Rated normal current: 630 A Rated frequency: 50 Hz

Manufacturer: Long and Crawford Ltd., Manchester, United Kingdom of Great Britain

Client: EPS UK Ltd., Loughborough, United Kingdom of Great Britain

Date of test: 06th June 2014

Applied test specifications:

The tests have been carried out in accordance to client's instructions based on:
IEC 62271-200 / Ed. 2.0 / 2011-10, Clause 6.6

Tests performed:

Three-phase short-time withstand current and peak withstand current test of the main circuit for a peak current of 62.5 kA and a short-time current of 25 kA – 1.5 s at 50 Hz.
Measurement of the resistance of the main circuit before and after the tests.

Test results:

The test object passed the tests performed in accordance with the applied test specifications.



Dr. Martin Wember
Manager of Laboratory

Matthias Kinast
Test Engineer

Ratingen, 16th January 2015

Notes

Accreditation:

ABB AG – Calor Emag Medium Voltage Products is certified according to ISO 9001:2008 and 14001:2004 and BS OHSAS 18001:2007 by DEKRA Certification GmbH under Reg. No. 51210777.

ABB Laboratories Ratingen are accredited according to DIN EN ISO/IEC 17025 by Deutsche Akkreditierungsstelle GmbH (DAkKS) under Reg.No. D-PL-12115-01-01 for tests of high-voltage equipment.

Uncertainty of the measurement systems:

The method of presentation of measuring results does not indicate an accuracy. As long as no explicit statements are made, the uncertainties required by the relevant standards have been complied with.

Addresses:

Testing Laboratory: ABB AG – Calor Emag Medium Voltage Products
High Power Testing Laboratory
Oberhausener Straße 33
40472 Ratingen, Germany

Phone: + 49 (0) 21 02 12 1353
Fax: + 49 (0) 21 02 12 1713
e-mail: martin.wember@de.abb.com

Manufacturer: Long & Crawford Ltd.
Gorton Read, Manchester
M12 5DA
United Kingdom of Great Britain

Client: EPS UK Ltd
75 Swingbridge Road
Loughborough
Leicestershire
LE11 5JB
United Kingdom of Great Britain

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List of Test Participants

Test Engineer / Test Operator:

Mr. Matthias Kinast
(Test Engineer) ABB Laboratories Ratingen, Germany

Mr. Joachim Köhler
(Measurement and Machine
Operator) ABB Laboratories Ratingen, Germany

Representatives of Client:

Mr. Andy Michel EPS UK Ltd.,Loughborough, United Kingdom of Great Britain

Mr. Scarolina Garzon EPS UK Ltd.,Loughborough, United Kingdom of Great Britain

Mr. Ben Sigsworth EPS UK Ltd.,Loughborough, United Kingdom of Great Britain

Further Participants:

-

-

**Technical Data of Test Object
Switchgear**

Test object: Metal-enclosed, oil-insulated switchgear equipped with three-position switch disconnecter.

Designation: Ring Main Unit Type T4GF3.

Manufacturer: Long and Crawford Ltd., Manchester, United Kingdom of Great Britain

Serial No.: 921263

Year of manufacture: 1992

Drawing No.: A209-0331

Ratings assigned by the manufacturer:

Rated voltage	7.2 / 12	kV
Rated normal current	630	A
Rated frequency	50	Hz
Rated lightning impulse withstand voltage	95	kV
Rated switching impulse withstand voltage	-	kV
Rated power-frequency withstand voltage	-	kV
Rated peak withstand current	46.9 / 55.8	kA
Rated short-time withstand current	21.9 / 18.4	kA
Rated duration of short-circuit	3	s
Insulating medium	oil	
Rated filling pressure for insulation	-	MPa abs. at 20 °C
Minimum functional pressure for insulation	-	MPa abs. at 20 °C

Permissible values for internal arc faults:

Peak current	-	kA
Short-circuit current	-	kA
Duration of short-circuit	-	s

Further data: -

Essential characteristics and installed devices: -

List of Identified Drawings

The manufacturer has guaranteed, that the equipment submitted for test has been manufactured in full accordance with the following drawings. ABB Test Lab has verified that these drawings adequately represent the equipment tested. These drawings have been stamped and signed by ABB Test Lab representatives and are kept

- with the test documents at the test laboratory.
 at the client.

The drawings contained in this document are identical with the checked, stamped and signed drawings.

Drawing No.	Rev.	P/D *)	Title	Additional remarks
A209-0331	16-11-90	D	GENERAL ARRANGEMENT OF TRANSFORMER MOUNTED & FREE STANDING TYPE T4GF3 RING MAIN UNIT FITTED WITH COMPOUND INSULATED CABLE BOXES:	Included in this test report

*) P: Parts list, D: Drawing

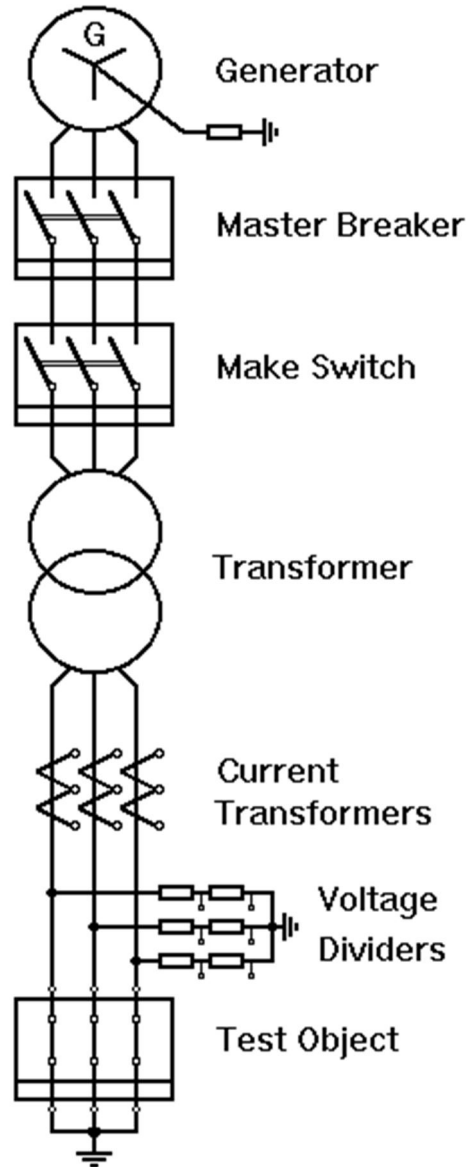
Technical Data of Test Circuit

Short-Time Withstand Current and Peak Withstand Current Test

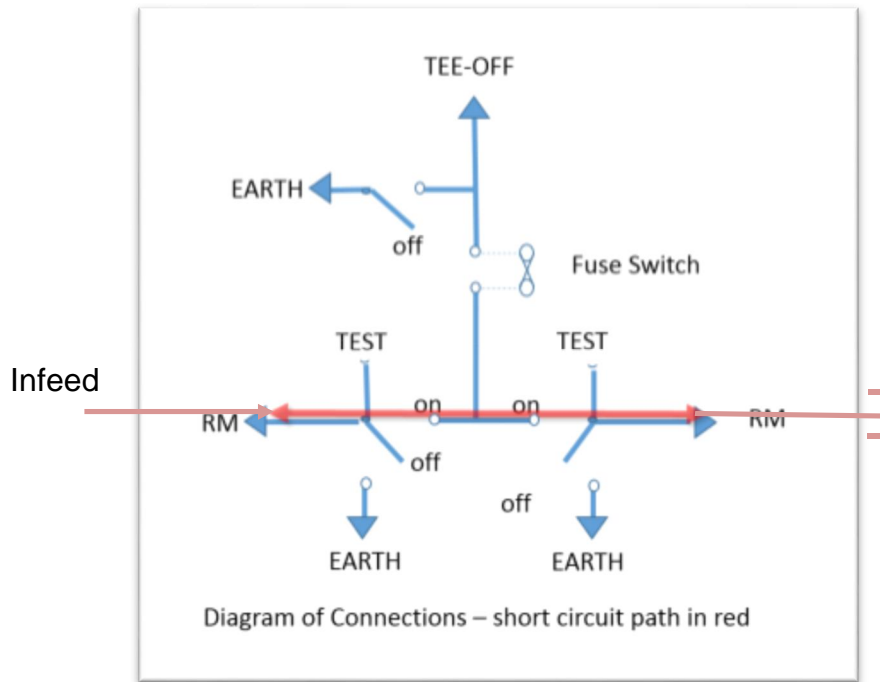
Test performed		STC	-
Test No.	XZ 289 F 005 /	02 - 11	-
Test circuit			
Circuit diagram	Sheet No.	9	-
Current circuit			
Number of phases		3	-
Power frequency	Hz	50	-
Power factor		< 0.15	-
Earthing conditions			
Generator / System		earthed via 5 kΩ	-
Transformer		not earthed	-
Short-circuit point		earthed	-
Test object		earthed	-
Test object (test values)			
Number of phases		3	-
Measurement			
Voltage measurement		Voltage Dividers 1000 V / 1 V	-
Current measurement		Current Transf. 50 kA / 5 A	-

Remarks: -

Circuit Diagram Short-Time Withstand Current and Peak Withstand Current Test



Test Setup Short-Time Withstand Current and Peak Withstand Current Test



Test Results

Short-Time Withstand Current and Peak Withstand Current Test

Test performed:	Short-Time Withstand Current and Peak Withstand Current Test
Date of test:	06 th June 2014
Condition of test object before test:	Unproved.
Test arrangement:	Direct test circuit, three-position switch disconnecter in metal-enclosed, oil-insulated switchgear.
Connections to test object:	Infeed via cables to the cable-terminals on the left hand side of the switchgear. Short-circuited on the cable-terminals of the right hand side of the switchgear, short-circuit point and switchgear earthed via cable.
Gas pressure (abs. rel. to 20 °C):	- MPa

Test No.	XZ 289 F 005 /		04	05	06	07	08	11	
Peak withstand current	L1	kA	47.3	27.0	52.1	30.3	62.7	39.7	
	L2	kA	44.3	30.8	48.9	34.1	58.3	41.3	
	L3	kA	37.6	28.3	41.7	33.0	52.2	36.4	
Short-circuit current	First cycle	L1	kA	24.8	18.8	27.5	20.9	32.9	25.4
		L2	kA	26.3	20.6	29.1	22.7	34.4	26.6
		L3	kA	24.3	19.0	27.0	22.0	33.6	25.5
	Last cycle	L1	kA	23.3	18.7	25.7	20.7	30.5	24.8
		L2	kA	25.1	19.1	27.5	21.5	32.2	26.0
		L3	kA	23.2	17.9	25.6	20.6	31.3	24.8
Equivalent current	L1	kA	23.2	18.8	25.7	20.9	30.6	24.4	
	L2	kA	25.1	19.9	27.6	22.1	32.4	25.7	
	L3	kA	23.2	18.4	25.7	21.3	31.7	24.4	
Average value	kA	23.8	19.0	26.3	21.4	31.6	24.9		
Duration of short-circuit		s	0.32	2.09	0.32	1.57	0.32	1.57	
Short-time withstand current	L1	kA	-	19.2	-	26.1	-	30.6	
	L2	kA	-	20.3	-	27.7	-	32.1	
	L3	kA	-	18.8	-	26.7	-	30.6	
	Average value	kA	-	19.5	-	26.8	-	31.1	
Related to rated duration of short-circuit		s	-	2.00	-	1.00	-	1.0	
Duration of short-circuit		s	-	2.22	-	1.63	-	1.50	
Related to rated short-time withstand current		kA	-	18.4	-	21.0	-	0.846	
Emission of flame/gas/oil			no	no	no	no	no	no	
Test result (P/N)			P	P	P	P	P	P	
Resistance of the main circuit before test Test current: 100 A (d.c.)	L1	μΩ	231	-	-	-	-	139.7	
	L2	μΩ	228	-	-	-	-	141.1	
	L3	μΩ	249	-	-	-	-	138.9	
	Ambient air temperature	°C	21.5	-	-	-	-	21.9	
Resistance of the main circuit after test Test current: 100 A (d.c.)	L1	μΩ	-	139.7	165.1	133.0	41.4	130.0	
	L2	μΩ	-	134.1	173.2	133.1	136.9	128.5	
	L3	μΩ	-	145.1	166.9	131.2	148.8	130.2	
	Ambient air temperature	°C	-	21.5	21.5	21.9	21.5	21.9	

Legend: P: Passed in terms of the applied standard N: Not passed in terms of the applied standard

Remarks: XZ 289 F 005 / 01: Current calibration
 XZ 289 F 005 / 02 and 03: Tests with reduced values
 XZ 289 F 005 / 08: Short-circuited direct at the cable-terminal on the right side.
 XZ 289 F 005 / 09 to 10: Tests with reduced values

Condition of test object after test: Test object not inspected (oil immersed contacts)

Photos

Photo No. 01:
Before test XZ 289 F 005 / 02
Test object, front view



Photo No. 02:
Before test XZ 289 F 005 / 02
Test object, side view

Photos

Photo No. 03:
After test XZ 289 F 005 / 05
Test object, front view



Photo No. 04:
Before test XZ 289 F 005 / 06
Test object, front view

Photos

Photo No. 05:
After test XZ 289 F 005 / 07
Test object, front view



Photo No. 06:
Before test XZ 289 F 005 / 010
Test object, front view

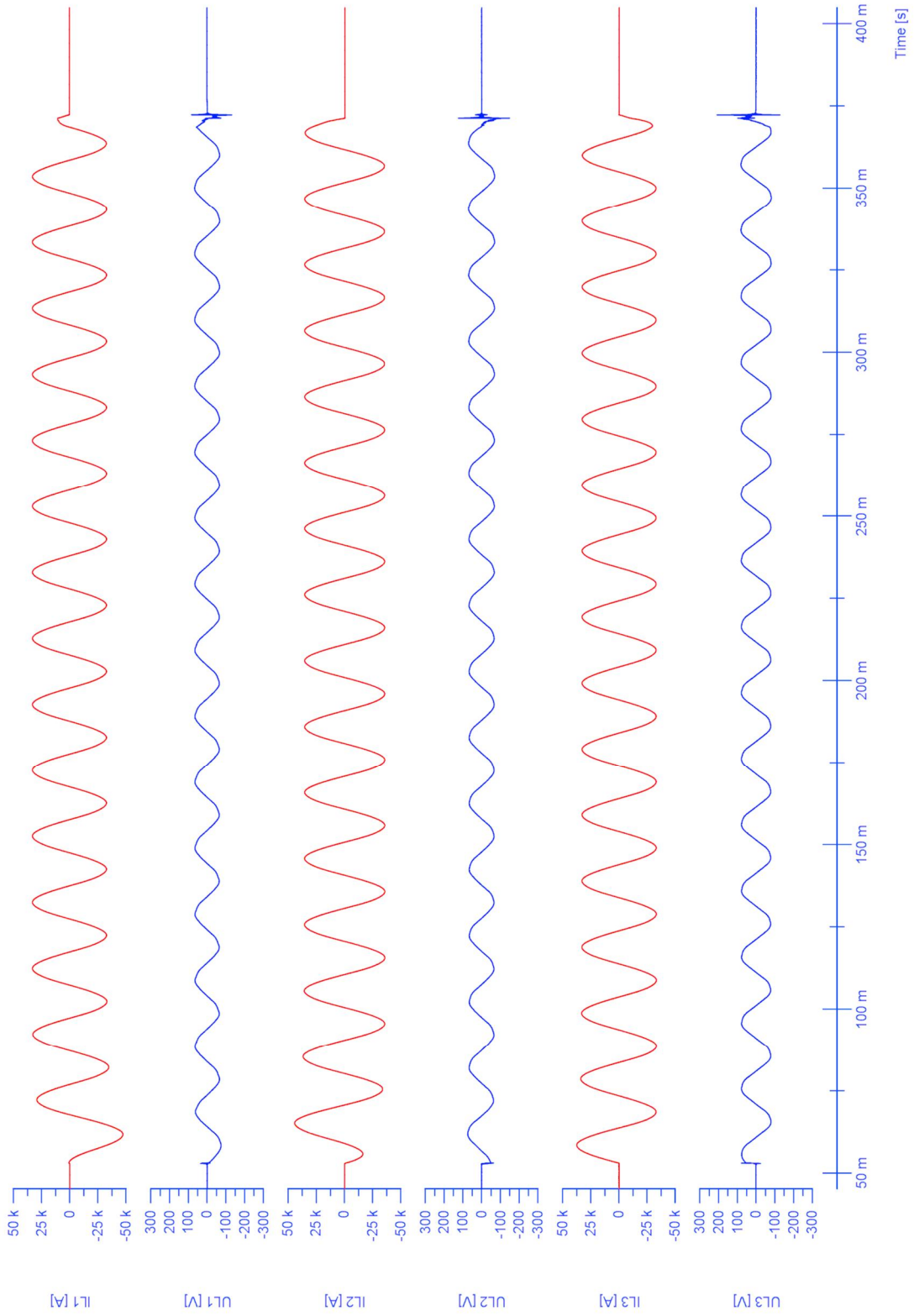
Photos

Photo No. 07:
After test XZ 289 F 005 / 011
Test object, front view

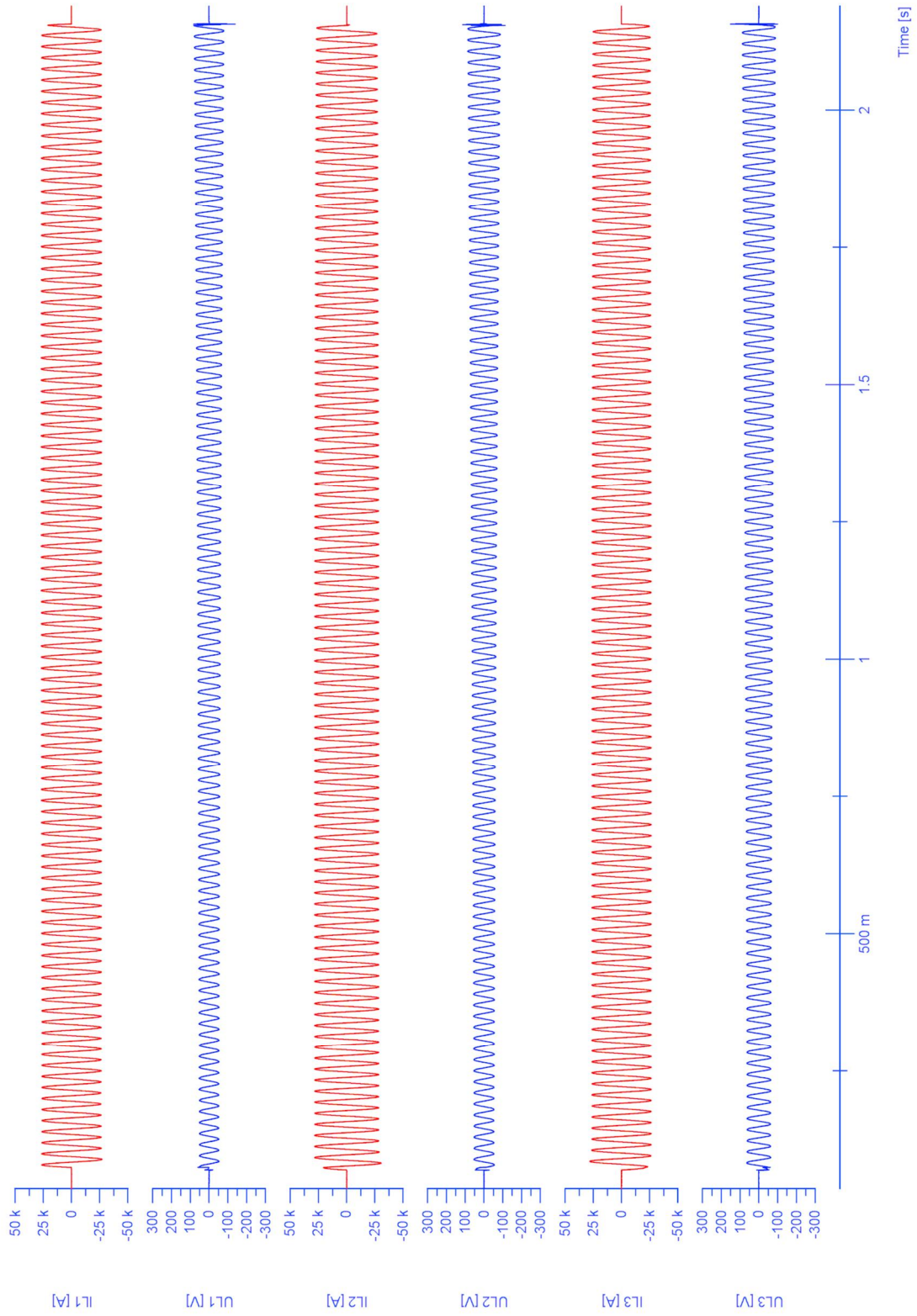


Photo No. 08:
After test XZ 289 F 005 / 011
Test object, side view

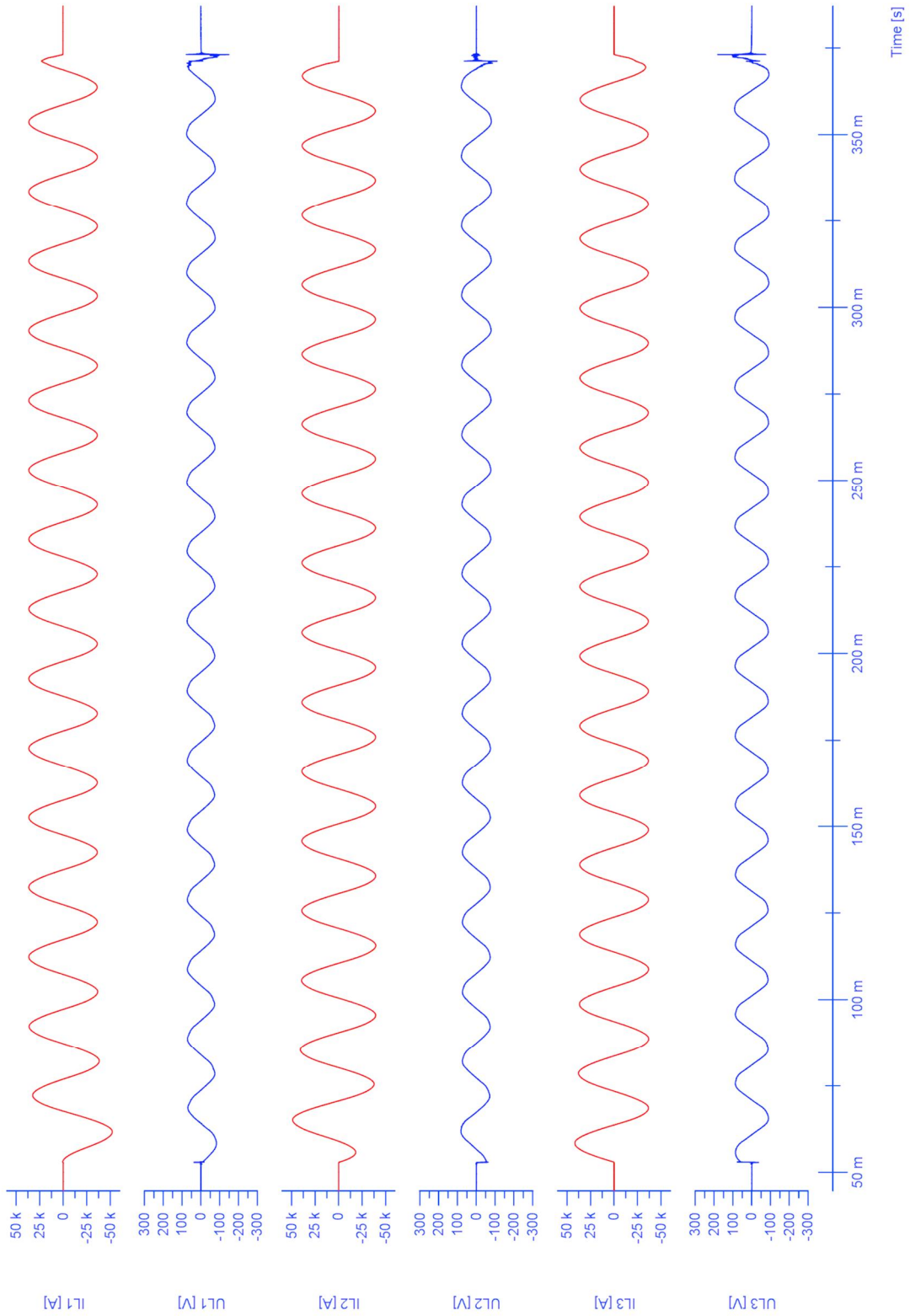
Oscillogram No. XZ 289 F 005 / 04 Peak Withstand Current Test



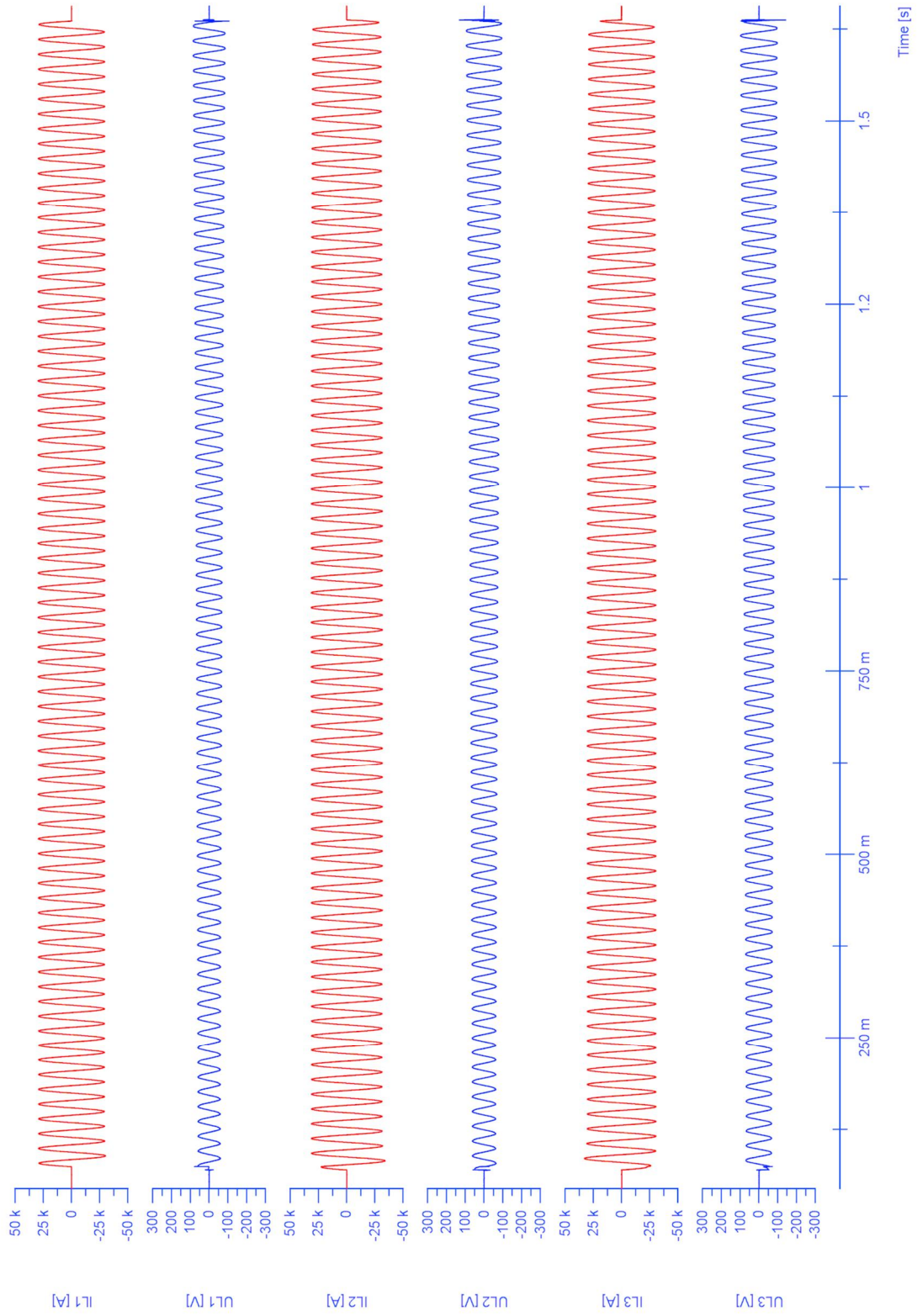
Oscillogram No. XZ 289 F 005 / 05 Short-Time Withstand Current Test - 2s



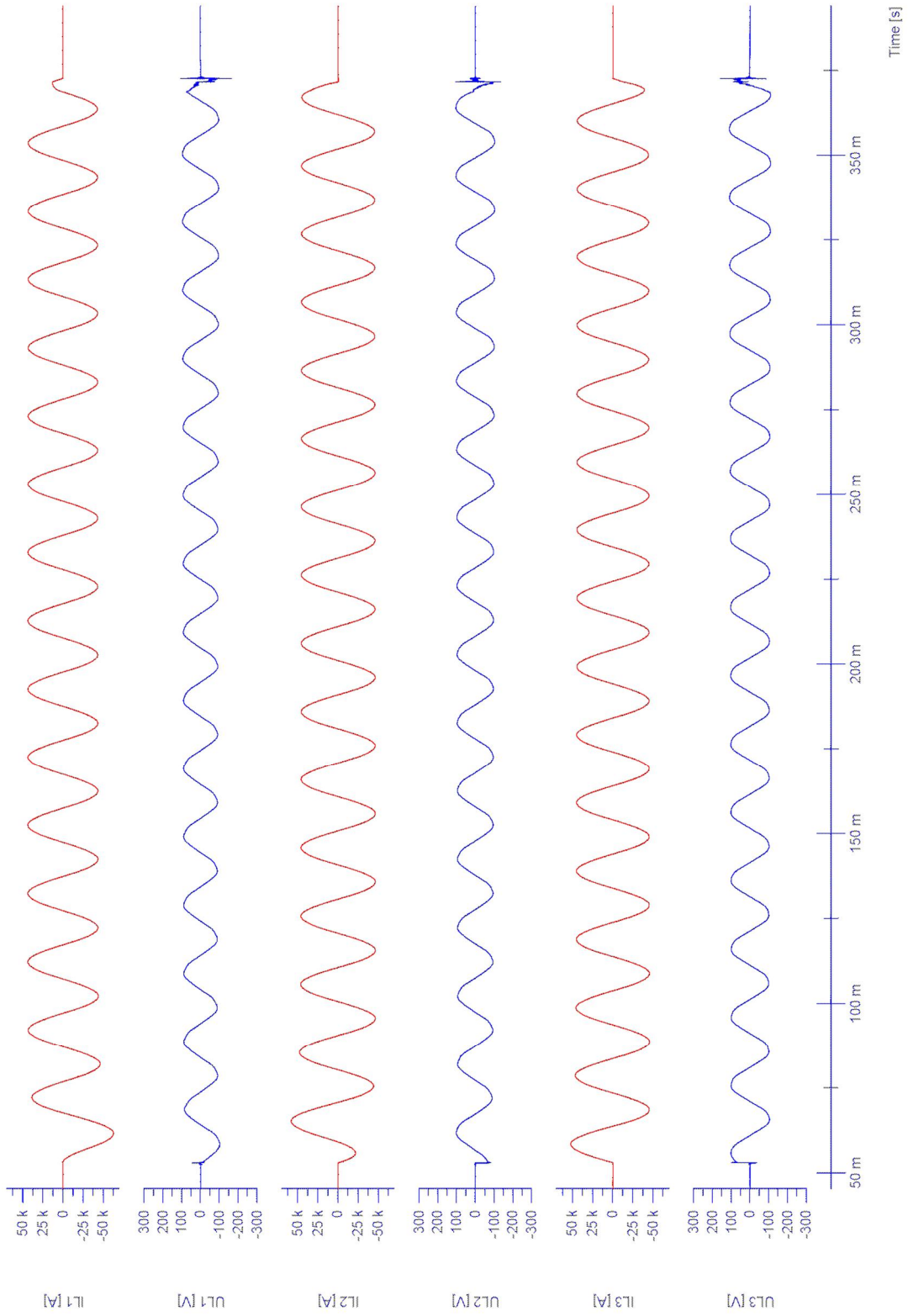
Oscillogram No. XZ 289 F 005 / 06 Peak Withstand Current Test



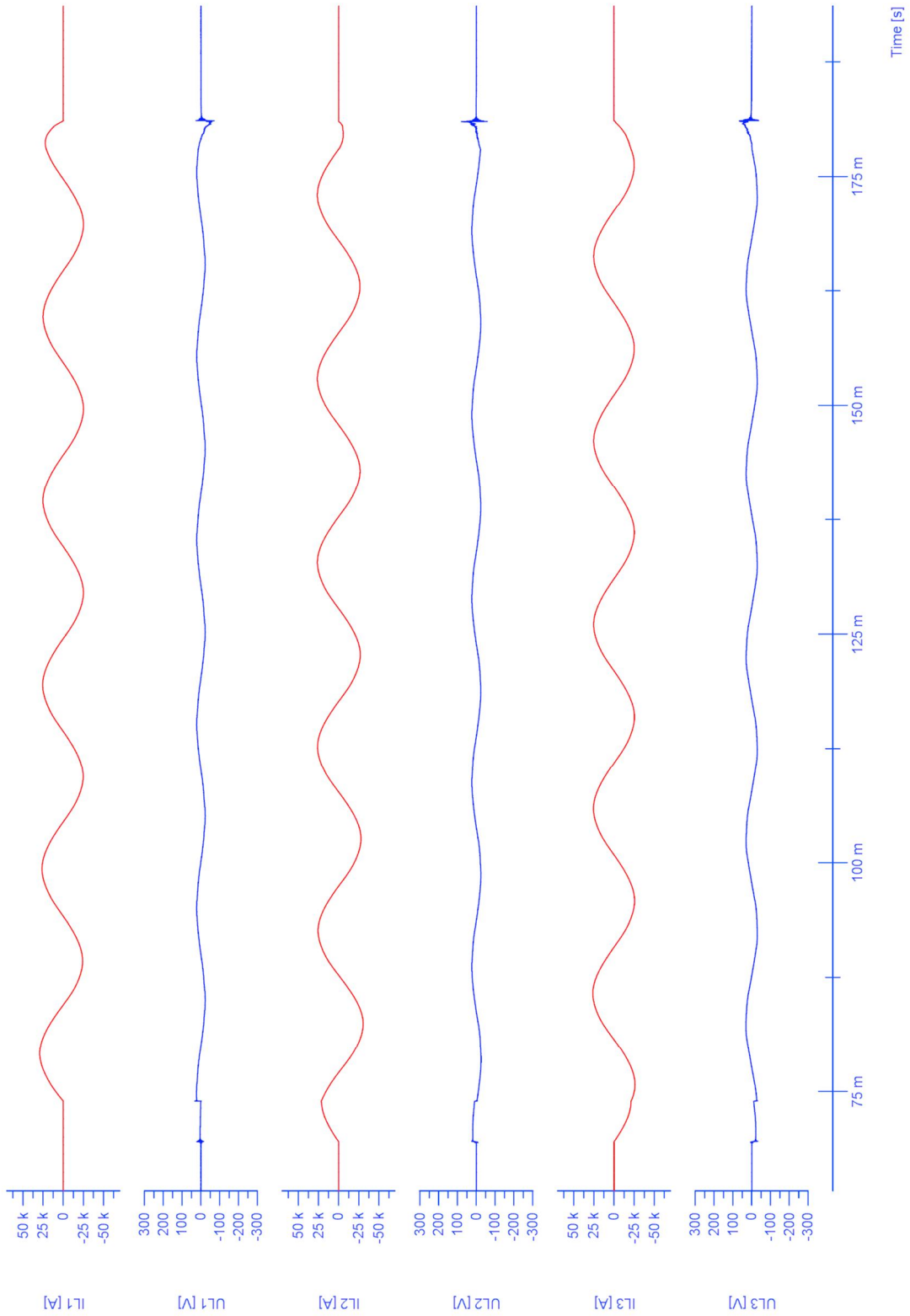
Oscillogram No. XZ 289 F 005 / 07 Short-Time Withstand Current Test – 1.5s



Oscillogram No. XZ 289 F 005 / 08 Peak Withstand Current Test



Oscillogram No. XZ 289 F 005 / 10 Peak Withstand Current Test



Oscillogram No. XZ 289 F 005 / 11 Short-Time Withstand Current Test – 1.5s

