



NATIONAL INSTITUTE FOR RESEARCH-DEVELOPMENT
AND TESTING IN ELECTRICAL ENGINEERING

ICMET CRAIOVA HIGH POWER DIVISION



HIGH POWER TESTING LABORATORY FOR
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TEST REPORT No. 12647

CUSTOMER: Panel Elektrik Hid. Mak. San. ve Tic. Ltd. ti
Organize Sanayi Bölgesi Turgut Özal Bulvar No:39, postal code 01310,
Sar çam / Adana / TURKEY

MANUFACTURER: Panel Elektrik Hid. Mak. San. ve Tic. Ltd. ti
Organize Sanayi Bölgesi Turgut Özal Bulvar No:39, postal code 01310,
Sar çam / Adana / TURKEY

TESTED PRODUCT: 36 kV, 630 A, 16 kA Incoming/Outgoing Metal Enclosed Switchgear
Assembly type PNL 36-01, with Load Break Switch

REFERENCE STANDARD: IEC 62271-200

TEST PERFORMED: Internal Arc Test

TEST DATE: 07.09.2017

TEST RESULT: Passed the tests

Report has 12 pages and it is edited in 4 copies from which copy 1 for laboratory and copies 2, 3 and 4 for customer.

**TECHNICAL MANAGER
OF HIGH POWER LABORATORY:**
Phys. Daniel Truta



**HEAD OF HIGH POWER
LABORATORY:**
Eng. Catalin Dobrea

DATE OF ISSUE: 14.09.2017

1. Results refer to test product only.

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Code: F-03.19.04

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1. IDENTIFICATION OF THE TEST PRODUCT

1.1. General informations

Type:	PNL 36-01 (for all Cubicles)
Serial number/year:	01170137 / 2017 (for Cubicle #1) 01170135 / 2017 (for Cubicle #2)
Contract No:	705.2/3154/06.04.2017
Product receiving date:	06.09.2017
Product condition at receiving:	New

1.2. Technical characteristics of the tested object

Rated voltage	36 kV
Rated current	630 A
Rated frequency	50 Hz
Rated short - time withstand current:	
- peak value	40 kA
- r.m.s. value	16 kA
Rated duration of short-circuit (t_k)	1 s
Internal fault current	- kA
Rated duration of internal fault current	1 s
IAC classification	AFL

1.3. Description of the tested object

A MV Incoming/Outgoing Metal Enclosed Switchgear assembly with Load break switch .

1.4. List of drawings

The manufacturer has guaranteed that the object submitted for tests has been manufactured in accordance with the following drawings. ICMET has verified that these drawings adequately represent the tested object. The manufacturer is responsible for the correctness of these drawings and the technical data presented.

The following drawings have been included in this test report:

Drawing number

See page 9

Revision

01

2. TESTS PROGRAM

2.1. One three-phase current calibration test.

2.2. One internal arc test according to IEC 62271-200 clause 6.106 and Annex AA with three-phase arc initiation in Cubicle #2 in cables compartment on lower terminals of Load Break Switch and three-phase supply in Cubicle #1, by means of flexible copper cables of $3 \times 185 \text{ mm}^2$.

2.3. One internal arc test according to IEC 62271-200 clause 6.106 and Annex AA with three-phase arc initiation in Cubicle #2 in busbar compartment and three-phase supply in Cubicle #1, by means of flexible copper cables of $3 \times 185 \text{ mm}^2$.

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Tests parameters were: $I_p = 40 \text{ kA}$, $I_k = 16 \text{ kA}$, $t_k = 1 \text{ s}$, $U = 6 \text{ kV}$, $f = 50 \text{ Hz}$.

The distances between assembly, walls and ceiling were:

- 100 mm from the lateral left wall
- 600 mm from the ceiling
- 100 mm from the rear wall

The combined vertical and horizontal indicators were placed in front and lateral right side of the assembly at 300 mm distance corresponding to accessibility class AFL.

3. ACCURACY OF MEASUREMENT

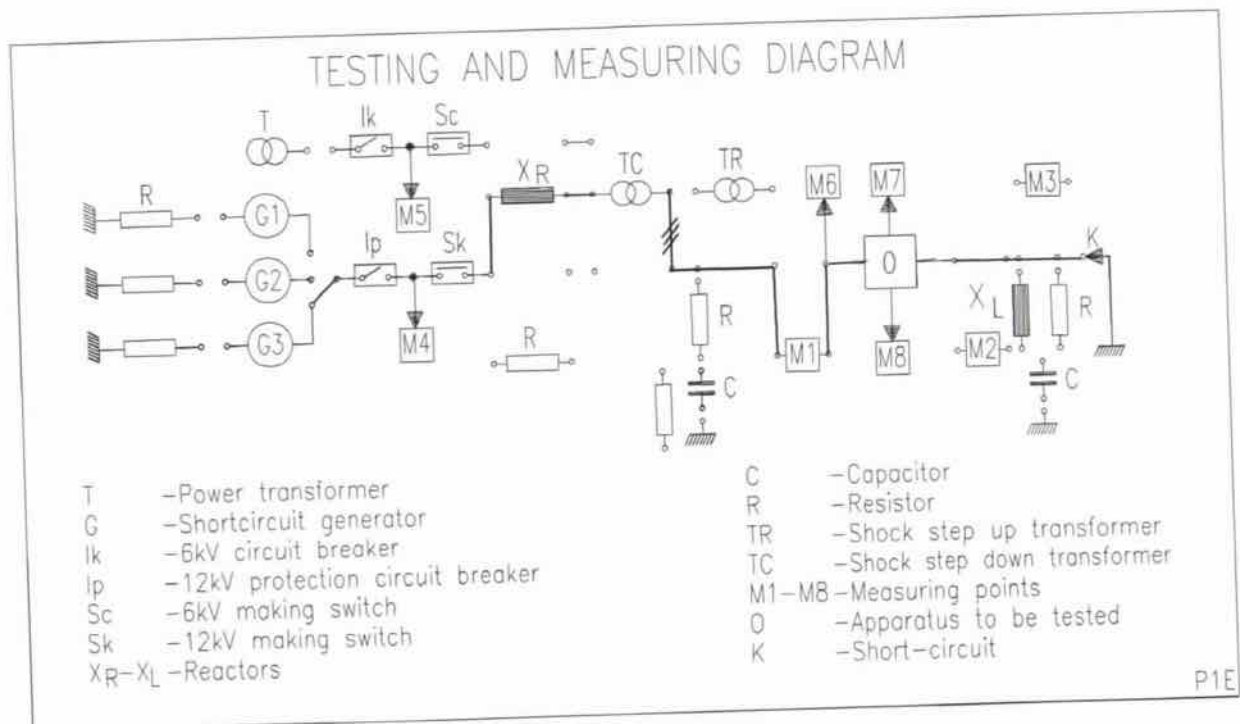
The guaranteed uncertainty for the measured voltages and currents taking in account the total measuring system, is less than 3%, unless mentioned otherwise.

4. RESPONSIBLE FOR TESTS: Eng. Cristian SALCEANU

5. PRESENT AT THE TESTS: Eng. Cenk YÜZERERO LU from PANEL ELEKTRİK /
TURKEY

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7. DATA OF TESTING AND MEASURING CIRCUIT



Number of phases		3
Supply / Connection		G3 / Δ
Transformer / Ratio		TC 4, 5, 6 / 1.07
Earthing	Supply	-
	Apparatus	Net earthing connection
Reactor	[mΩ]	132
Power factor		<0.15
M1 - Test current – Rogowski coils 50 kA/V		
M6 - Test voltage – Voltage divider 50 kV/50 V		
M8 – Data acquisition system TRAS 1: 16 bit, 16 channels		

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8. LEGEND

Explanation of the letter symbols and abbreviations on the oscillograms:

U₁₂, U₂₃, U₃₁ = Voltage drop on arc between phases L1, L2, L3
I₁, I₂, I₃ = Short-circuit currents on phases L1, L2, L3

9. VALUES OBTAINED ON TESTS

Internal arc test						
Oscillogram no./2017			96398	96399	96400	
Applied voltage, between phase value	L1	kV	6.2	6.1	6.1	
	L2	kV	6.2	6.1	6.1	
	L3	kV	6.2	6.1	6.1	
Peak value of current	L1	kA	-5.5	-23.9	-35.7	
	L2	kA	26.4	6.7	19.3	
	L3	kA	-40.1	-37.4	-39.1	
Equivalent rms value of short-circuit current, phase value	L1	kA	16.2	16.1	16.1	
	L2	kA	16.3	16.1	16.2	
	L3	kA	16.4	16.3	16.3	
Voltage drop on arc, between phases values	L ₁₂	kV	-	0.87	0.88	
	L ₂₃	kV	-	0.86	0.87	
	L ₃₁	kV	-	1.09	0.89	
Average rms current		kA	16.3	16.17	16.2	
Arc duration		s	-	1	1	

Oscillogram no./2017	REMARKS
96398	Current calibration
96399	Internal arc test in cables compartment
96400	Internal arc test in busbar compartment

Detailed aspects of 36 kV, 630 A, 16 kA Incoming/Outgoing Metal Enclosed Switchgear Assembly type PNL 36-01, with Load Break Switch before and after internal arc tests are presented in photos 1 to 7.

The ambient temperature was 28 °C.

10. TEST RESULT

The criteria to pass the test from clause 6.106.5 from IEC 62271-200 were fulfilled.

36 kV, 630 A, 16 kA Incoming/Outgoing Metal Enclosed Switchgear Assembly type PNL 36-01, with Load Break Switch, passed the internal arc test (for IAC-AFL).

- END OF DOCUMENT -



Photos 1,2,3,4 – Aspect of 36 kV, 630 A, 16 kA Incoming/Outgoing Metal Enclosed Switchgear Assembly type PNL 36-01 in test circuit before internal arc test in cables compartment

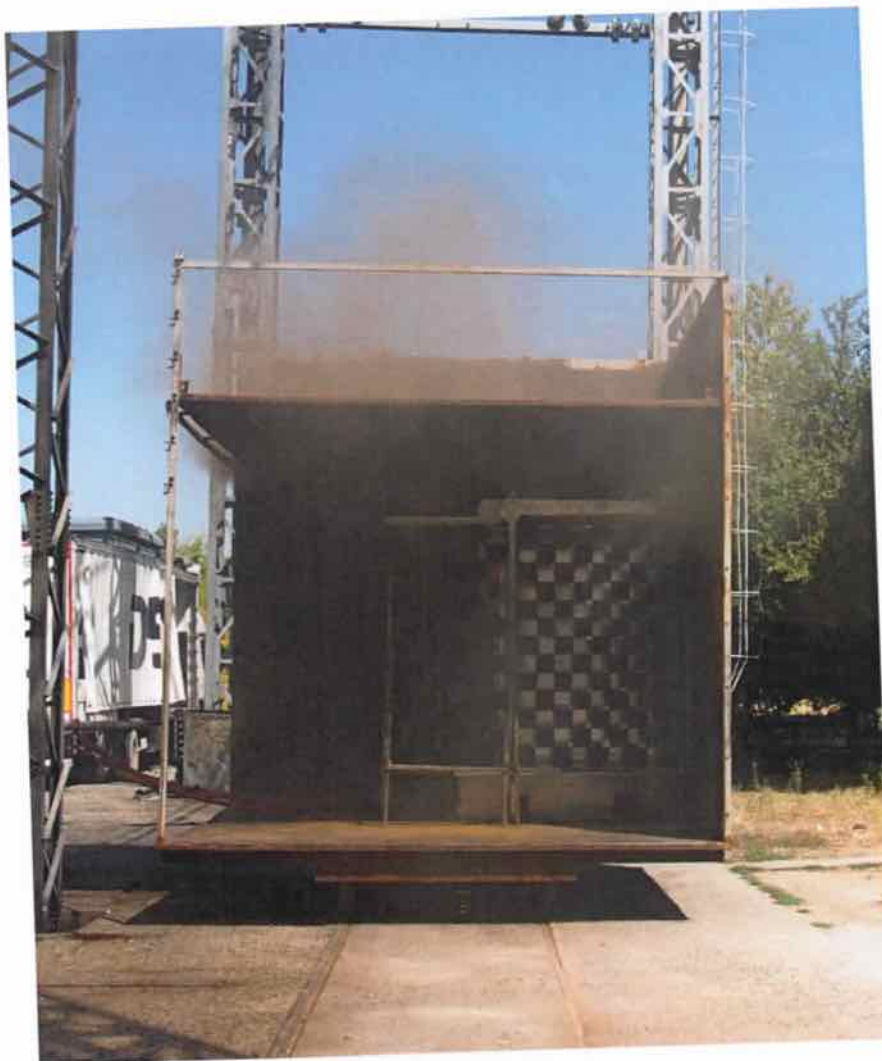


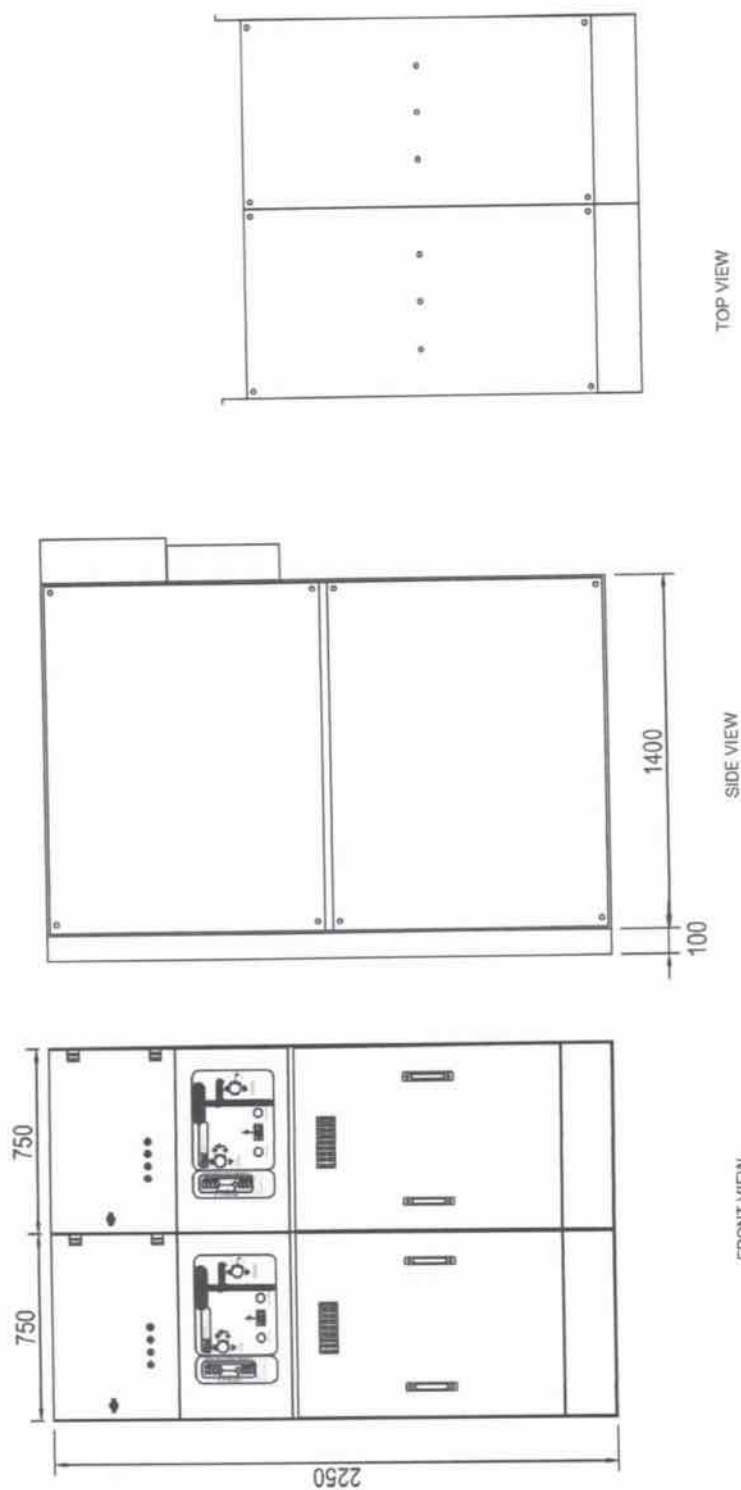
Photo 5 – Aspect of 36 kV, 630 A, 16 kA Incoming/Outgoing Metal Enclosed Switchgear Assembly type PNL 36-01 in test circuit after internal arc test in cables compartment



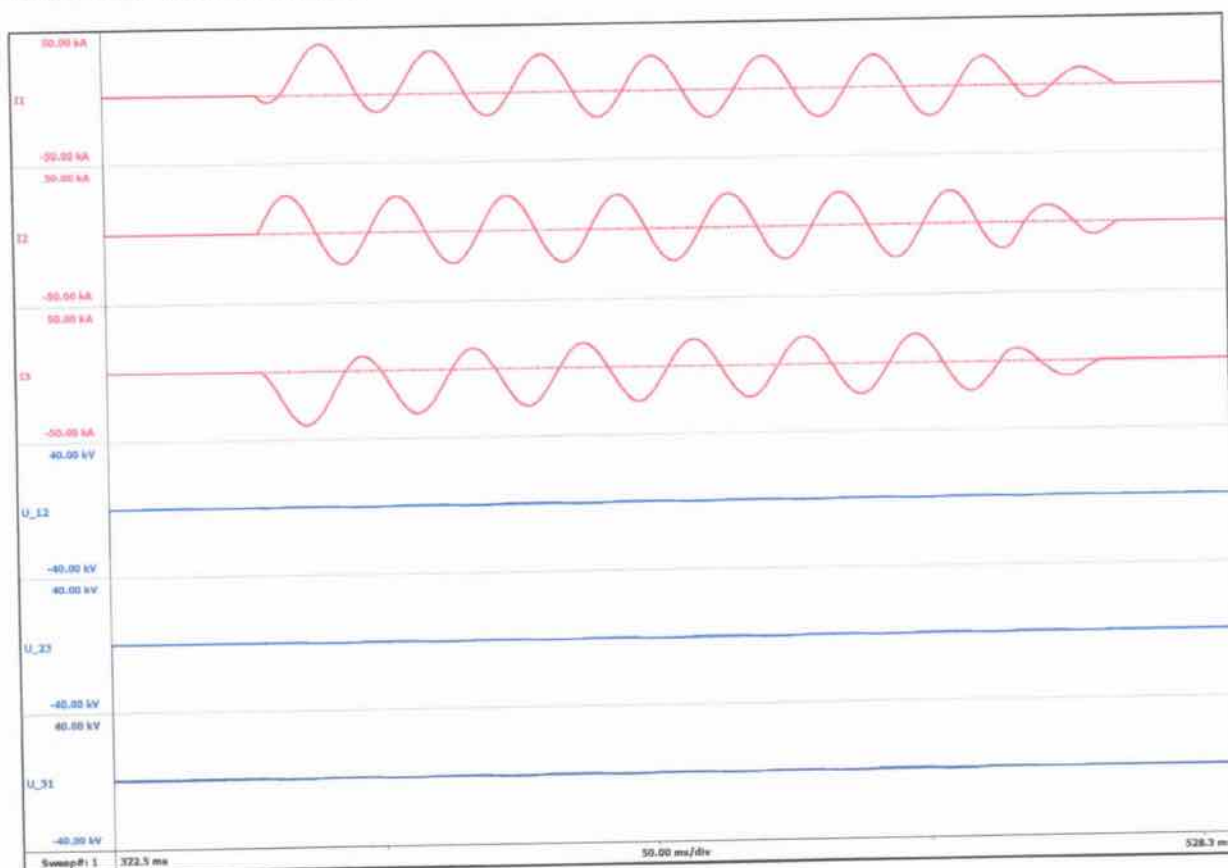
Photo 6 – Aspect of 36 kV, 630 A, 16 kA Incoming/Outgoing Metal Enclosed Switchgear Assembly type PNL 36-01 in test circuit before internal arc test in busbar compartment



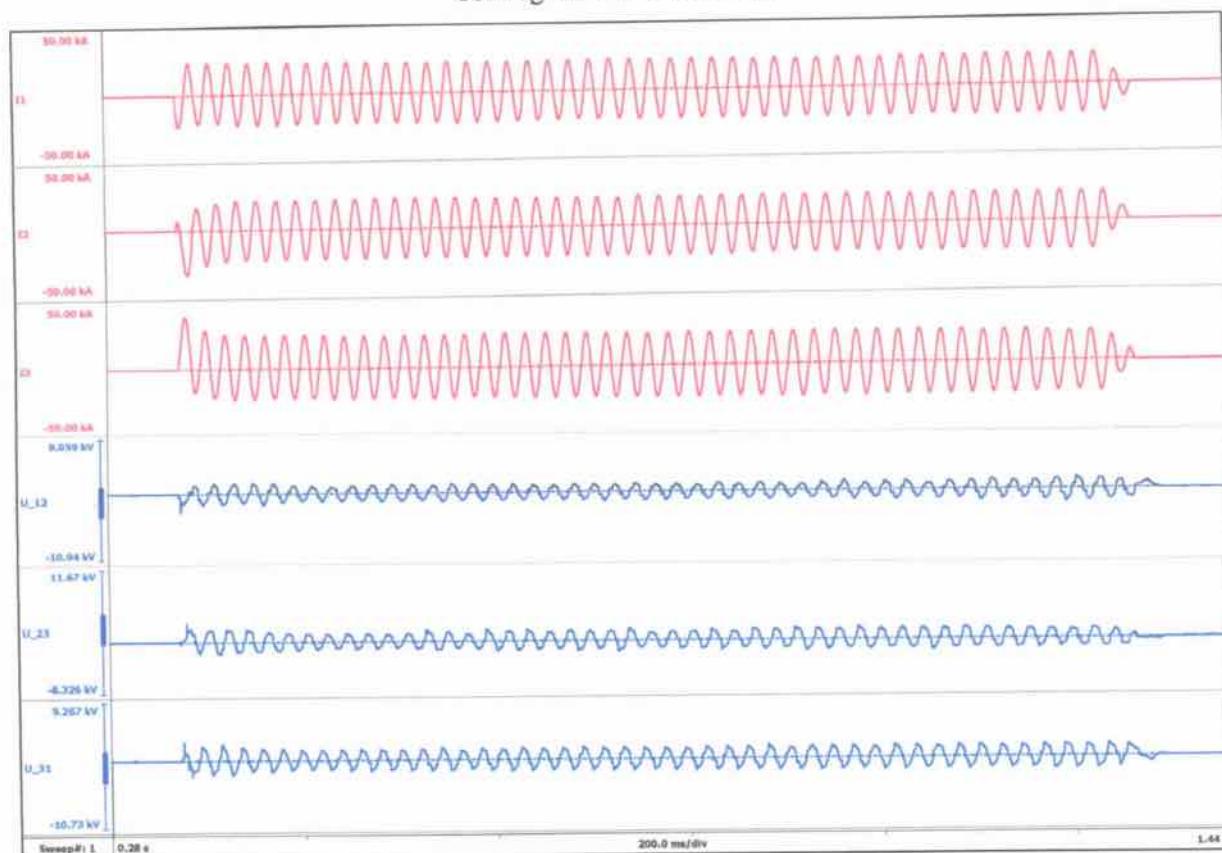
Photo 7 – Aspect of 36 kV, 630 A, 16 kA Incoming/Outgoing Metal Enclosed Switchgear Assembly type PNL 36-01 in test circuit after internal arc test in busbar compartment



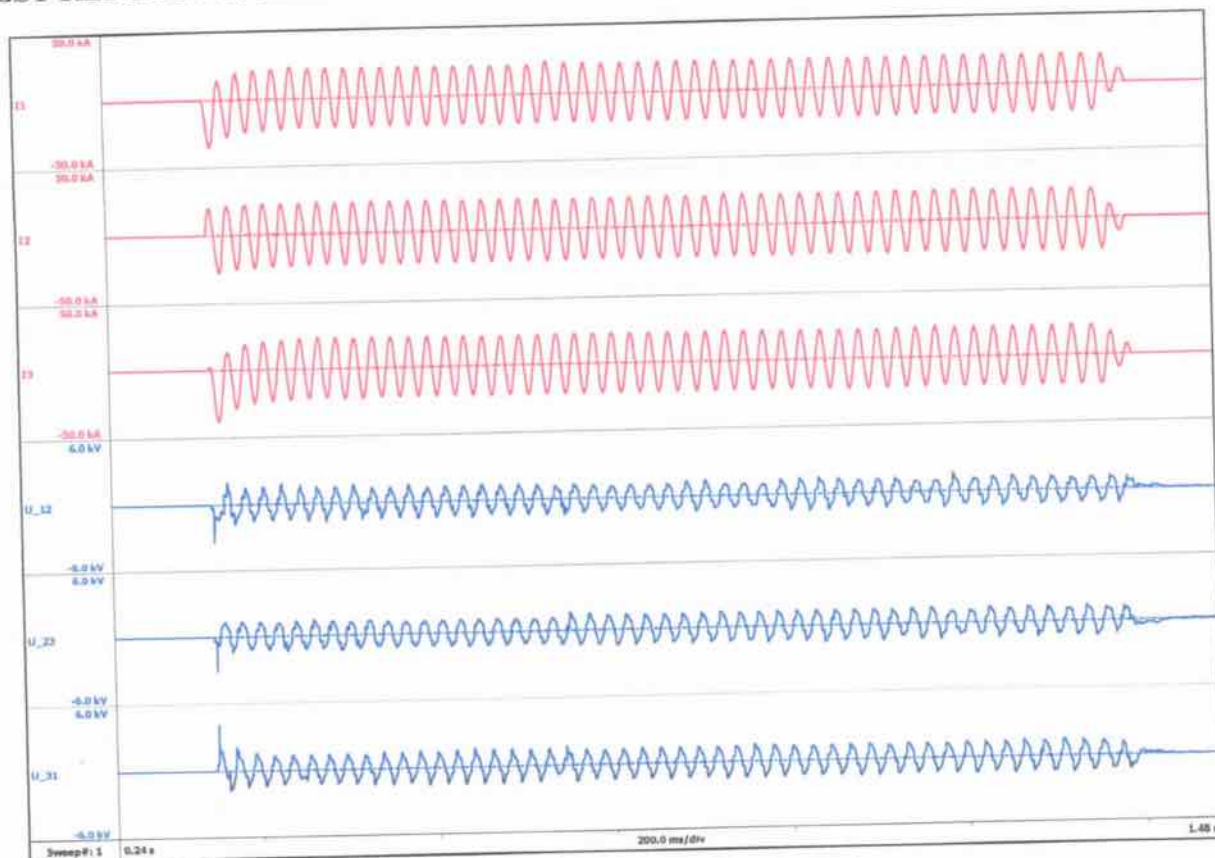
Customer		Rev. N°:		Sheet of	
Date		Scale		1/1	
Designed by		Reviewed by		Contract No.	
Approved by		A4		material	



Oscillogram No. 96398 / 2017



Oscillogram No. 96399 / 2017



Oscillogram No. 96400 / 2017