



NATIONAL INSTITUTE FOR RESEARCH-DEVELOPMENT  
AND TESTING IN ELECTRICAL ENGINEERING

# ICMET CRAIOVA HIGH POWER DIVISION



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TESTING  
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ACCREDITATION CERTIFICATE  
LI 004

HIGH POWER TESTING LABORATORY FOR  
ELECTRICAL EQUIPMENT (HPL)

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## TEST REPORT No. 12646

**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:** 36/0.4 kV, 1000 kVA Monoblock Concrete Transformer Substation

**REFERENCE STANDARD:** IEC 62271-202

**TEST PERFORMED:** Internal Arc Test

**TEST DATE:** 06.09.2017

**TEST RESULT:** Passed the tests

*Report has 19 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

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2. Publication or reproduction of the contents of this report in any other form unless its complete photocopying is not allowed without writing approval of division to which laboratory belongs to.  
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Code: F-03.19.04

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**TEST REPORT No. 12646****1. IDENTIFICATION OF THE TEST PRODUCT****1.1. General informations**

Type: NLB 525 (for Substation)  
 PNL 36-01 (Incoming/Outgoing Cubicle with LBS) (Cubicle #1)  
 PNL 36-04 (Incoming/Outgoing Cubicle with CB) (Cubicle #2)  
 PNL 36-01 (Incoming/Outgoing Cubicle with LBS) (Cubicle #3)

Serial number/year: 0179 / 2017 (for Substation)  
 01170134 / 2017 (for Cubicle #1)  
 04170084 / 2017 (for Cubicle #2)  
 01170136 / 2017 (for Cubicle #3)

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**

	<u>Substation</u>	<u>Cubicles</u>
Rated power	1000 kVA	- kVA
Rated voltage	36 kV	36 kV
Rated current	- A	630 A
Rated frequency	50 Hz	50 Hz
Rated short - time withstand current:		
- peak value	- kA	40 kA
- r.m.s. value	- kA	16 kA
Rated duration of short-circuit ( $t_k$ )	- s	1 s
Internal fault current	16 kA	16 kA
Rated duration of internal fault current	1 s	1 s
IAC classification	IAC AB	AFL

**1.3. Description of the tested object**

A Monoblock Concrete Substation equipped with 1000 kVA power transformer, low voltage panel and Incoming/Outgoing Cubicles with SF6 Circuit-Breaker and 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 pages 11 to 17

**Revision**

01

**2. TESTS PROGRAM****2.1. One three-phase current calibration test.**



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**2.2.** One internal arc test for IAC-A with three-phase arc initiation in Cubicle #3 in switching compartment on lower terminals of Load Break Switch and three-phase supply in Cubicle #2, by means of flexible copper cables of 3x185 mm<sup>2</sup>.

The combined vertical and horizontal indicators were placed in the front side of the assemblies at 300 mm distance corresponding to accessibility class A.

**2.3.** One internal arc test for IAC-B with three-phase arc initiation in Cubicle #1 in switching compartment on lower terminals of Load Break Switch and three-phase supply in Cubicle #2, by means of flexible copper cables of 3x185 mm<sup>2</sup>.

The combined vertical and horizontal indicators were placed at 100 mm distance, in front of all accessible sides of the substation. All the doors of the substation were correctly secured and closed.

Tests parameters were:  $I_p = 40 \text{ kA}$ ,  $I_k = 16 \text{ kA}$ ,  $t_k = 1 \text{ s}$ ,  $f = 50 \text{ Hz}$ ,  $U = 6 \text{ kV}$ .  
Arcing point was initiated by means of a copper wire with 0.5 mm diameter.

Tests are performed according IEC 62271-202 clause 6.106 and Annex AA .

**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

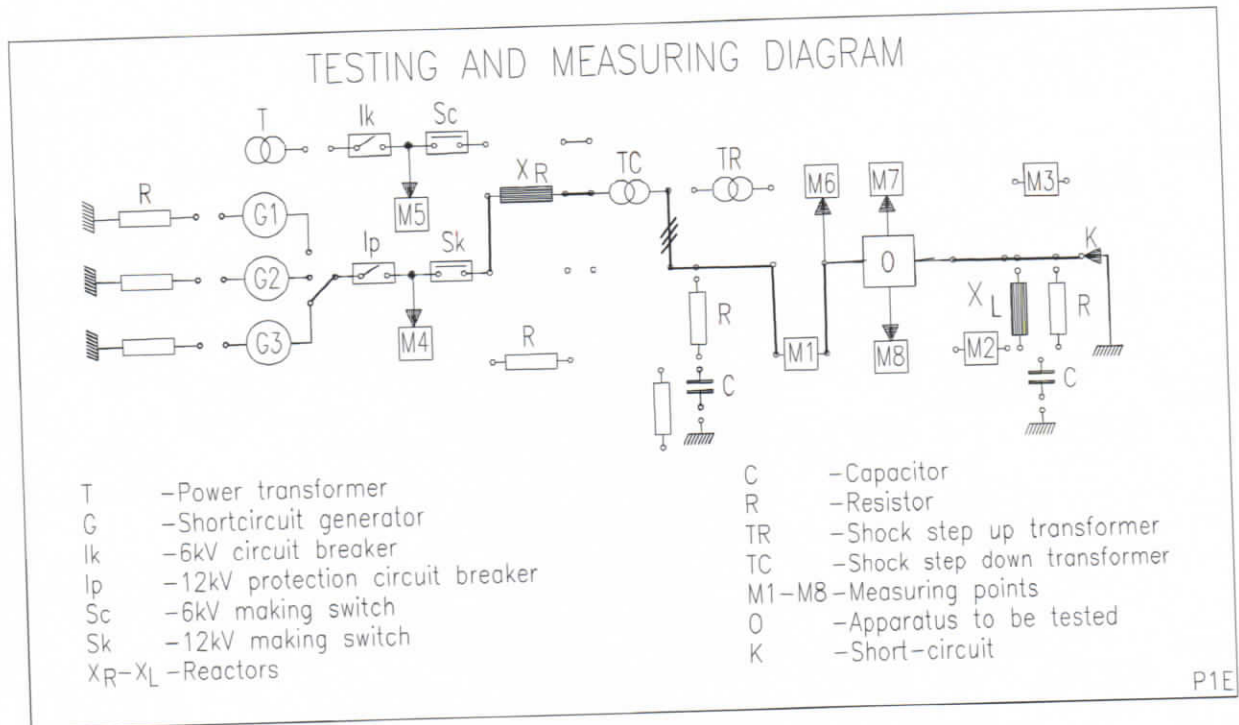
**6. TEST REPORT DOCUMENTATION:**

Oscillograms: 3  
Photos: 9

Drawings: 7

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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:**

U<sub>12</sub>, U<sub>23</sub>, U<sub>31</sub> = Voltage drop on arc between phases L1, L2, L3  
I<sub>1</sub>, I<sub>2</sub>, I<sub>3</sub> = Short-circuit currents on phases L1, L2, L3

9. VALUES OBTAINED ON TESTS

Internal arc test						
Oscillogram no./2017			96395	96396	96397	
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	-41.2	-37.2	-38.2	
	L2	kA	-7.87	-8.9	-10.1	
	L3	kA	26.7	23.6	25.6	
Equivalent rms value of short-circuit current, phase value	L1	kA	16.2	16.1	16.3	
	L2	kA	16.2	16.1	16.2	
	L3	kA	16.4	16.3	16.1	
Voltage drop on arc, between phases values	L 12	kV	-	0.98	0.81	
	L 23	kV	-	0.85	0.86	
	L 31	kV	-	1.12	0.87	
Average rms current		kA	16.27	16.17	16.2	
Arc duration		s	-	1	1	

Oscillogram no./2017	REMARKS
96395	Current calibration
96396	Internal arc test for IAC-A
96397	Internal arc test for IAC-B

Detailed aspects of 36/0.4 kV, 1000 kVA Monoblock Concrete Transformer Substation before and after IAC-AB tests are presented in photos 1 to 9.

The ambient temperature was 28 °C.

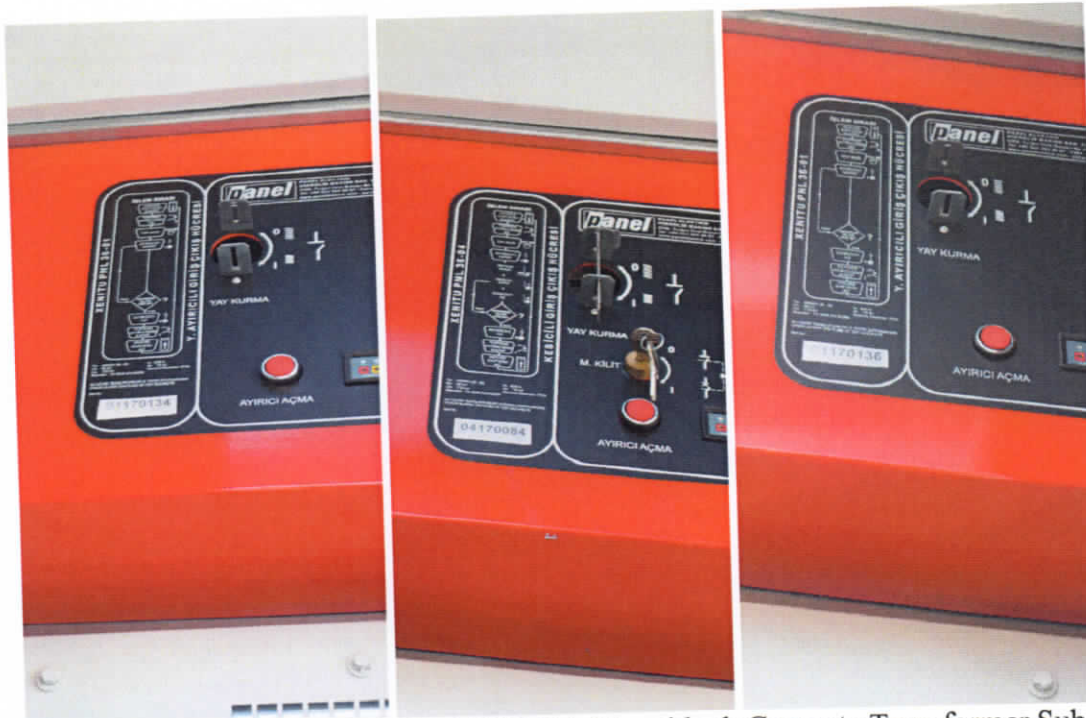
10. TEST RESULT

The criteria to pass the test from clause 6.102.5.1 and 6.102.5.2 from IEC 62271-202 were fulfilled.

**36/0.4 kV, 1000 kVA Monoblock Concrete Transformer Substation passed the internal arc test (for IAC-AB).**

- END OF DOCUMENT -





Photos 1,2,3,4 – Aspect of 36/0.4 kV, 1000 kVA Monoblock Concrete Transformer Substation Medium voltage compartment with label details in test circuit before internal arc test for IAC-A



Photos 5,6 – Aspect of 36/0.4 kV, 1000 kVA Monoblock Concrete Transformer Substation with label details in test circuit before internal arc test for IAC-A





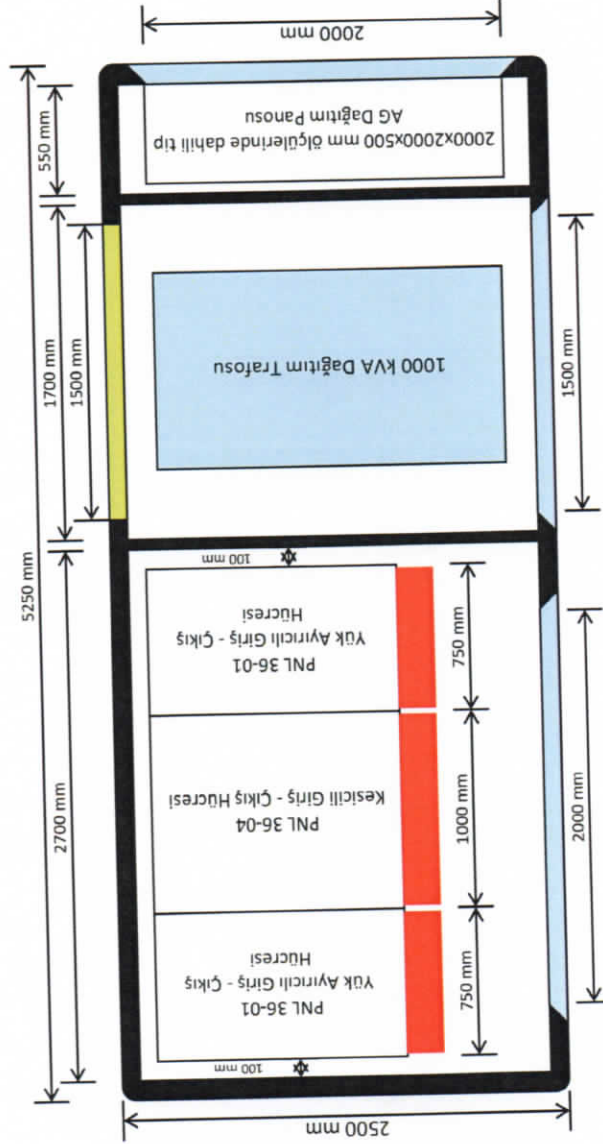
Photo 7 – Aspect of 36/0.4 kV, 1000 kVA Monoblock Concrete Transformer Substation  
in test circuit after internal arc test for IAC-A



Photo 8 – Aspect of 36/0.4 kV, 1000 kVA Monoblock Concrete Transformer Substation in test circuit before internal arc test for IAC-B



Photos 9 – Aspect of 36/0.4 kV, 1000 kVA Monoblock Concrete Transformer Substation in test circuit after internal arc test for IAC-B



Ağırlık: ~ 20.220 kg

## NLB 525 OG TR AG KÖŞK YERLEŞİMİ

panel

PANEL ELEKTRİK

Adana H. Sabancı Org. San. Bölgesi  
Turgut Özal Bulvarı No:39  
Sarıçam/Adana 01310  
www.panelelektrik.com

TARİH

MÜŞTERİ ONAYI

PROJE ADI

HAZIRLAYAN

MÜŞTERİ ADI

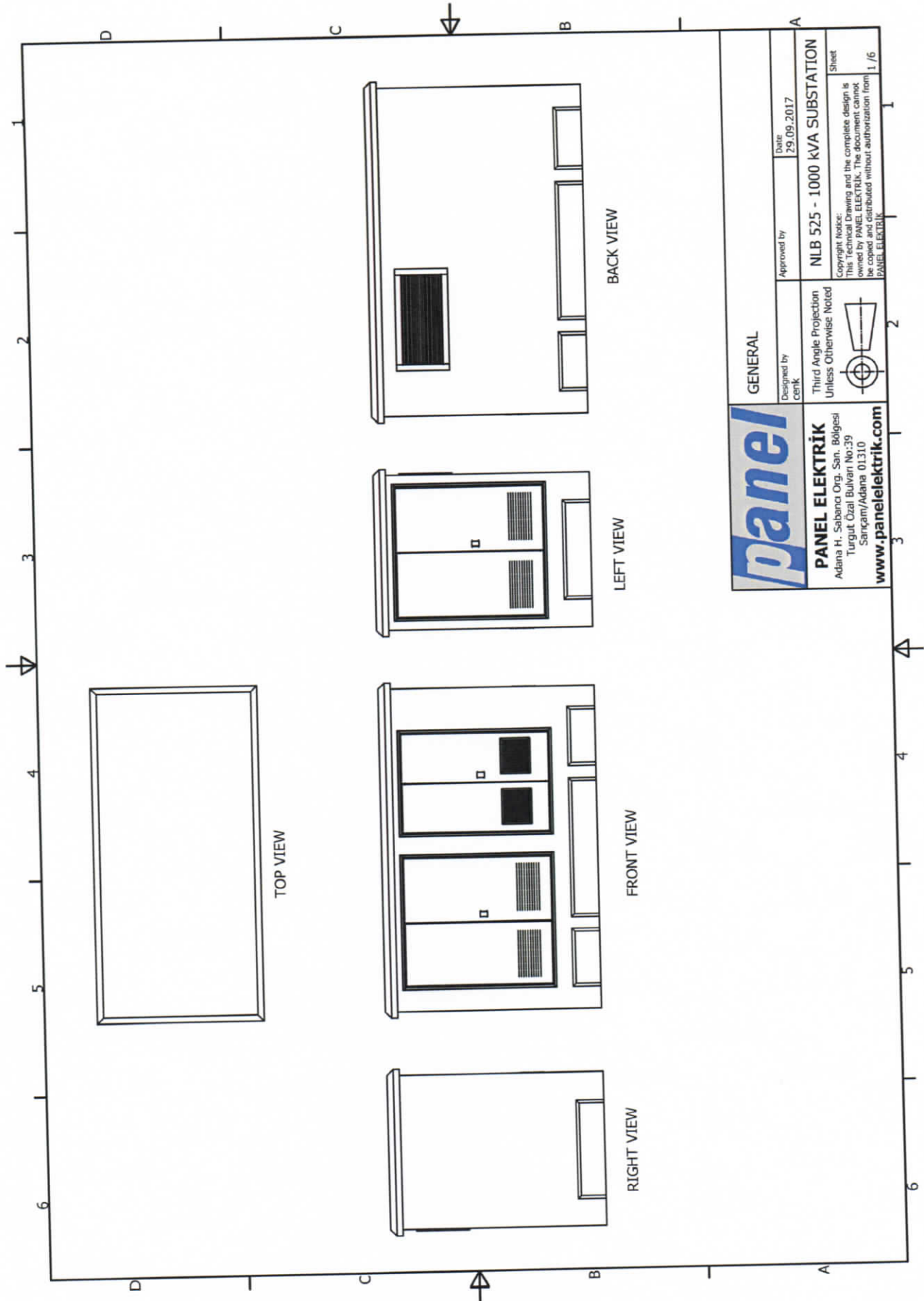
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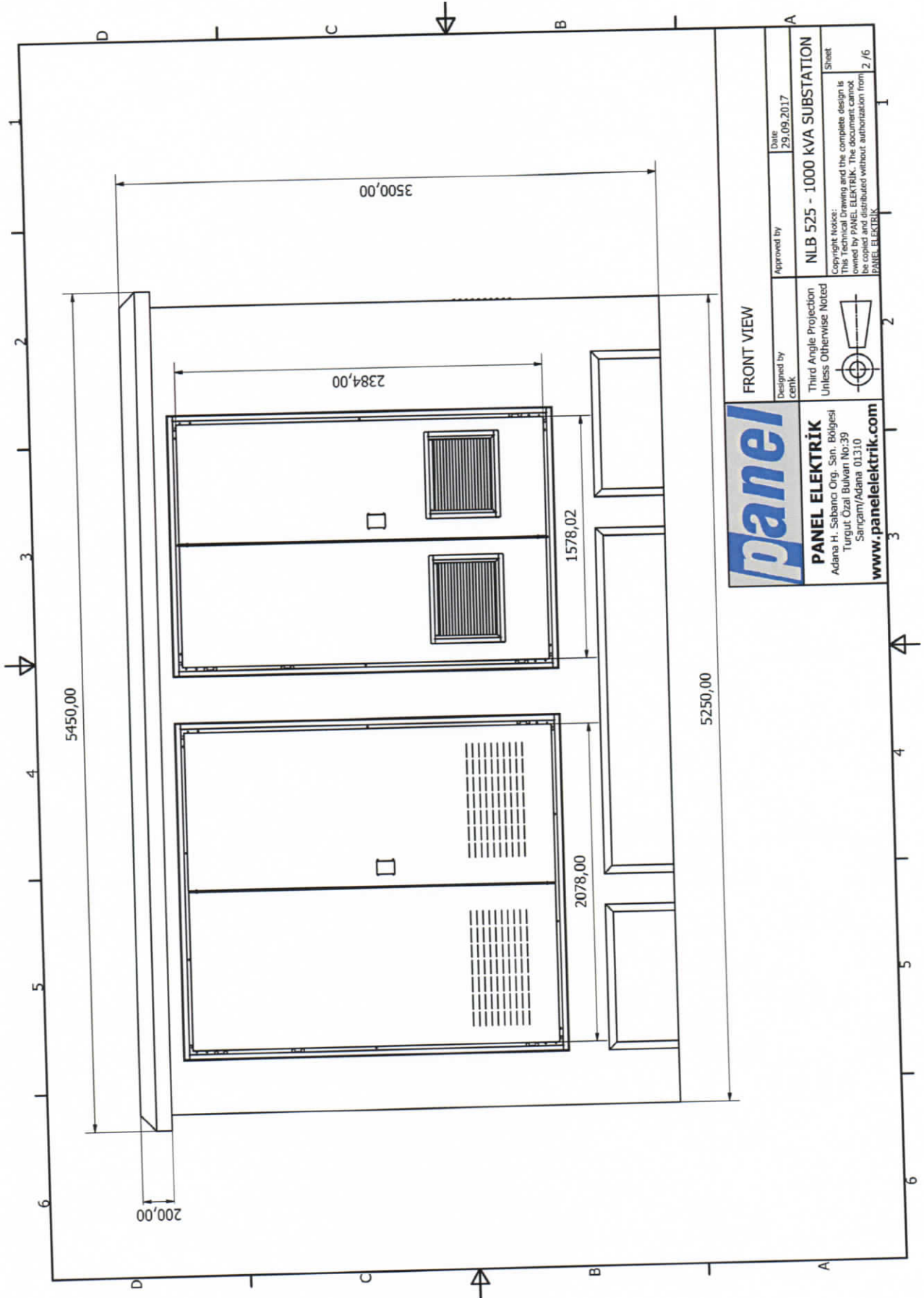
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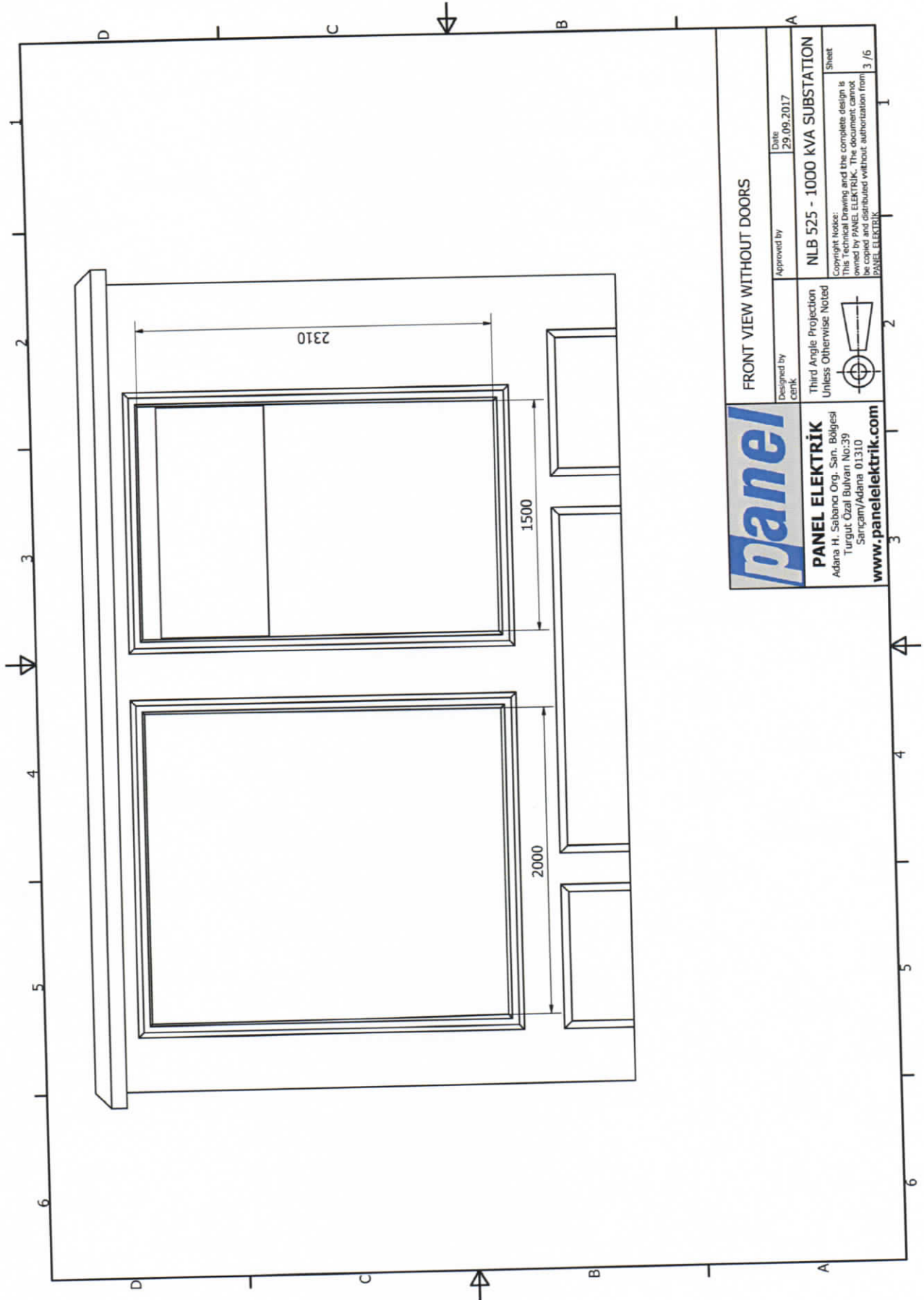
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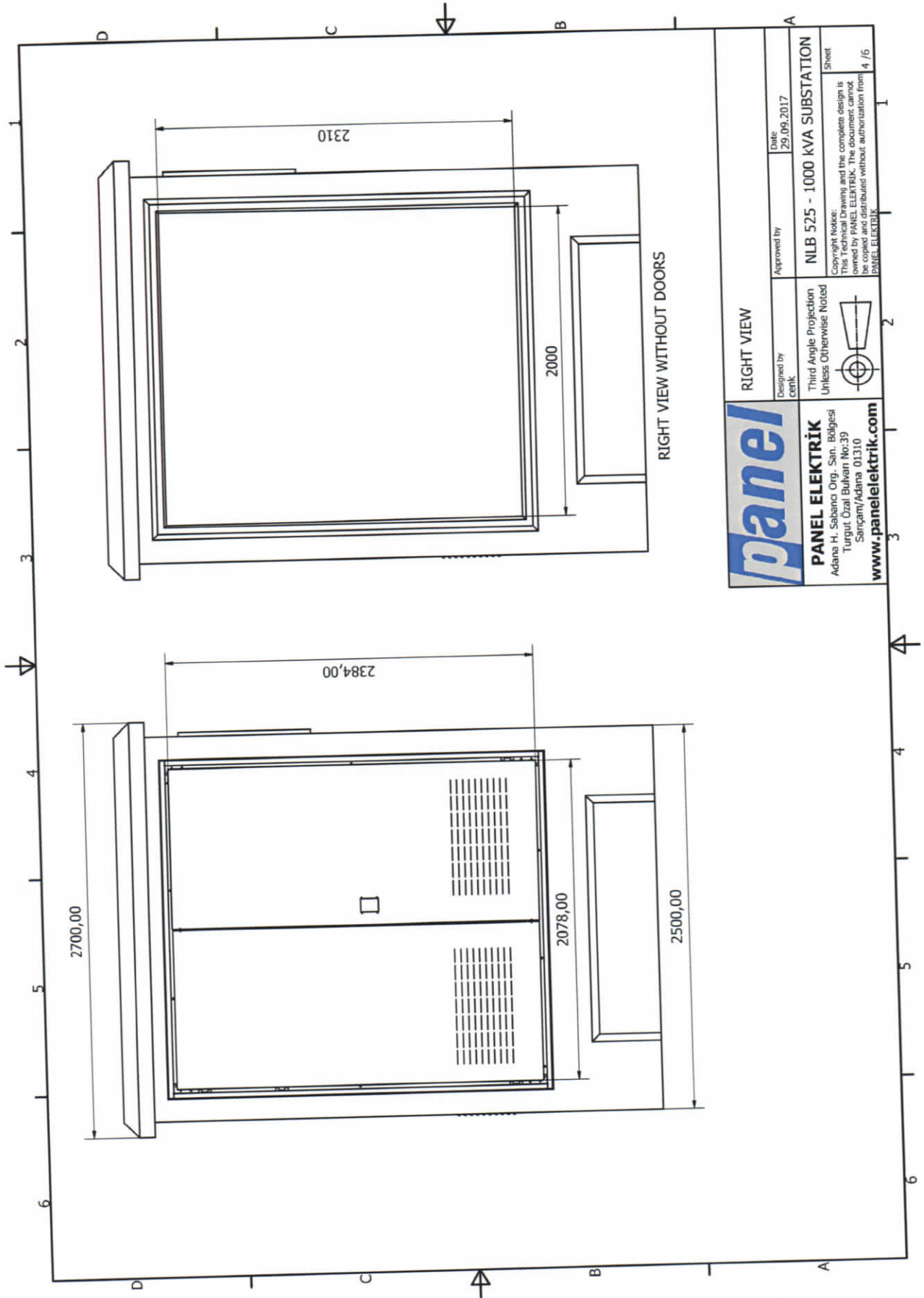


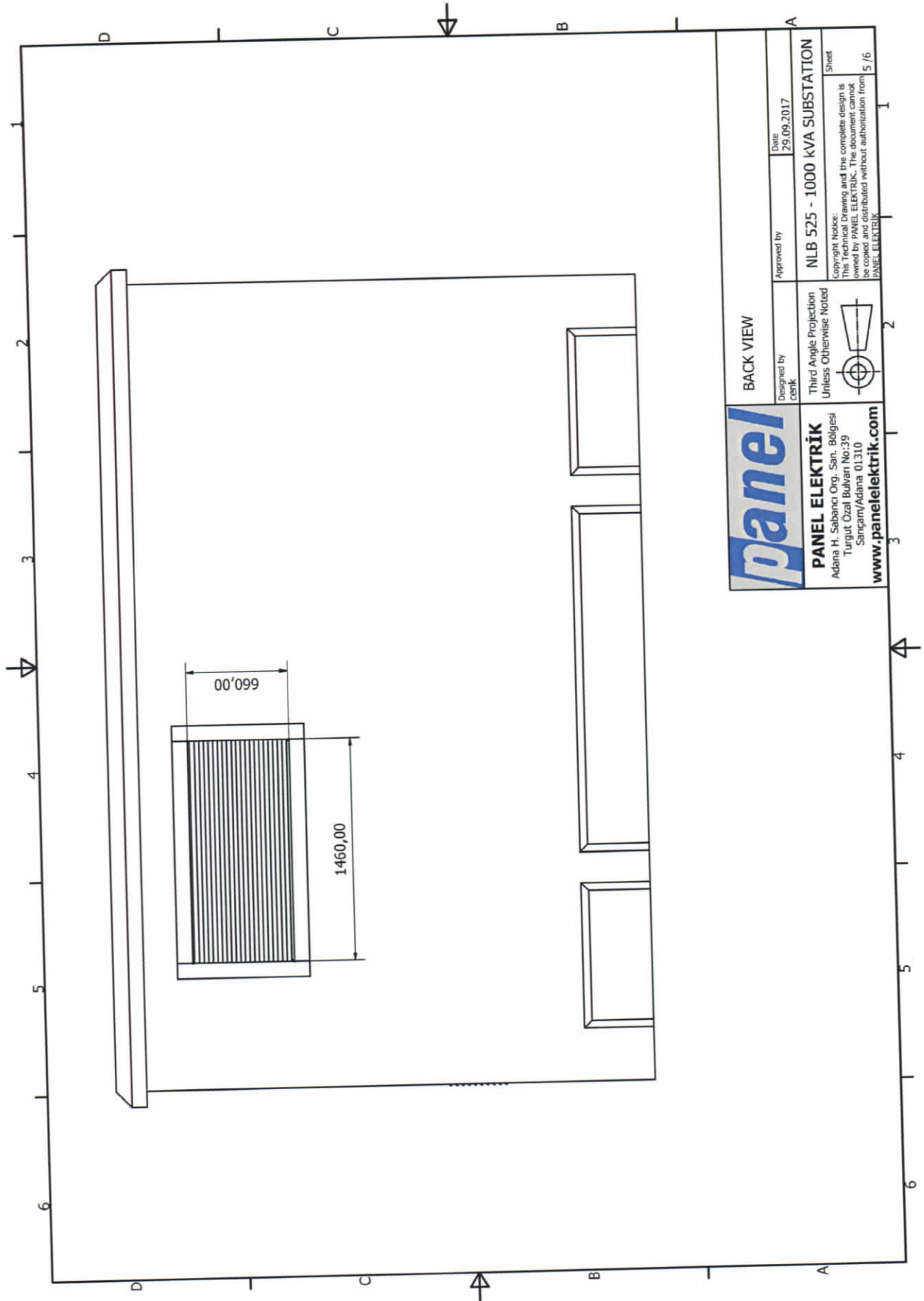


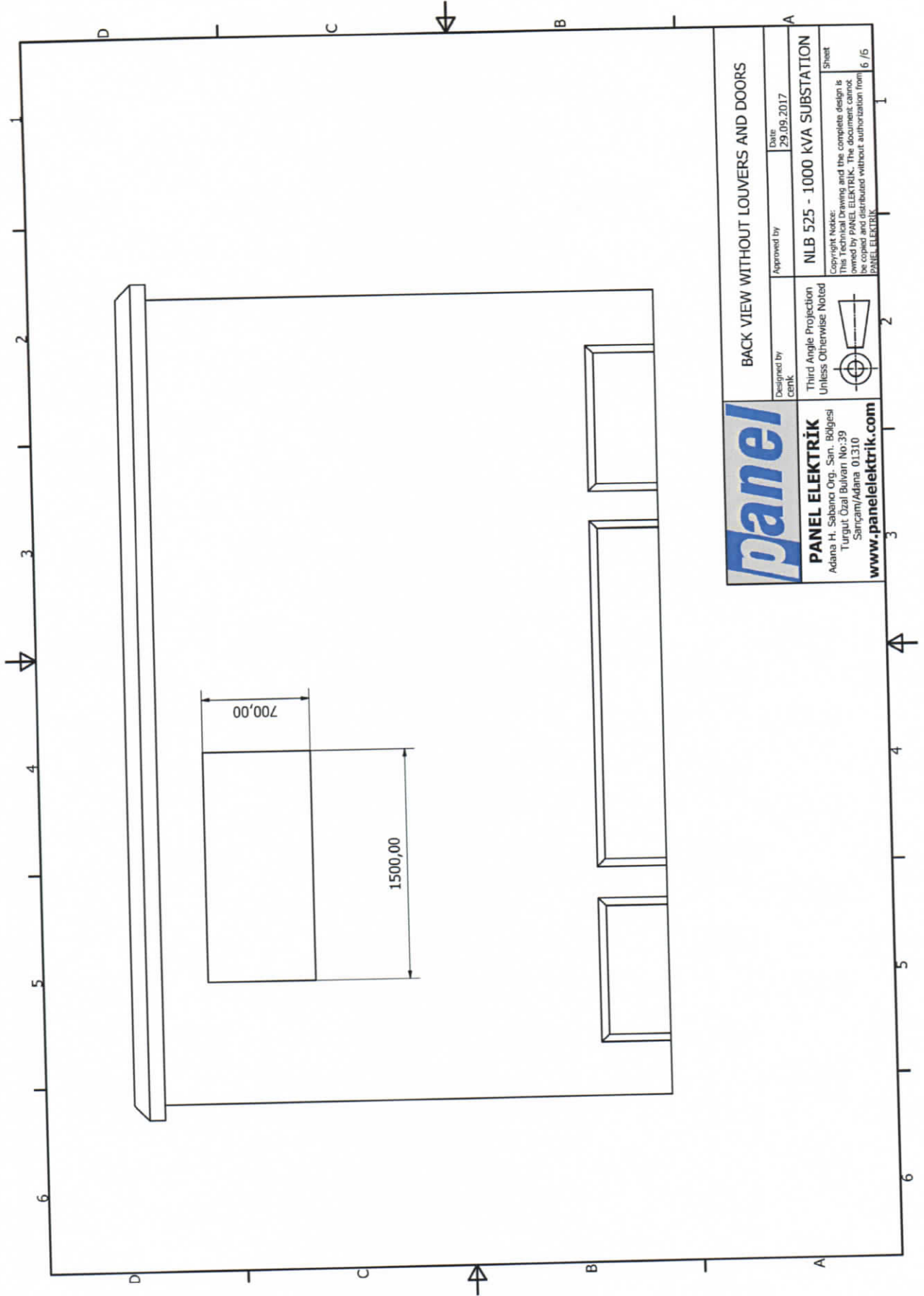




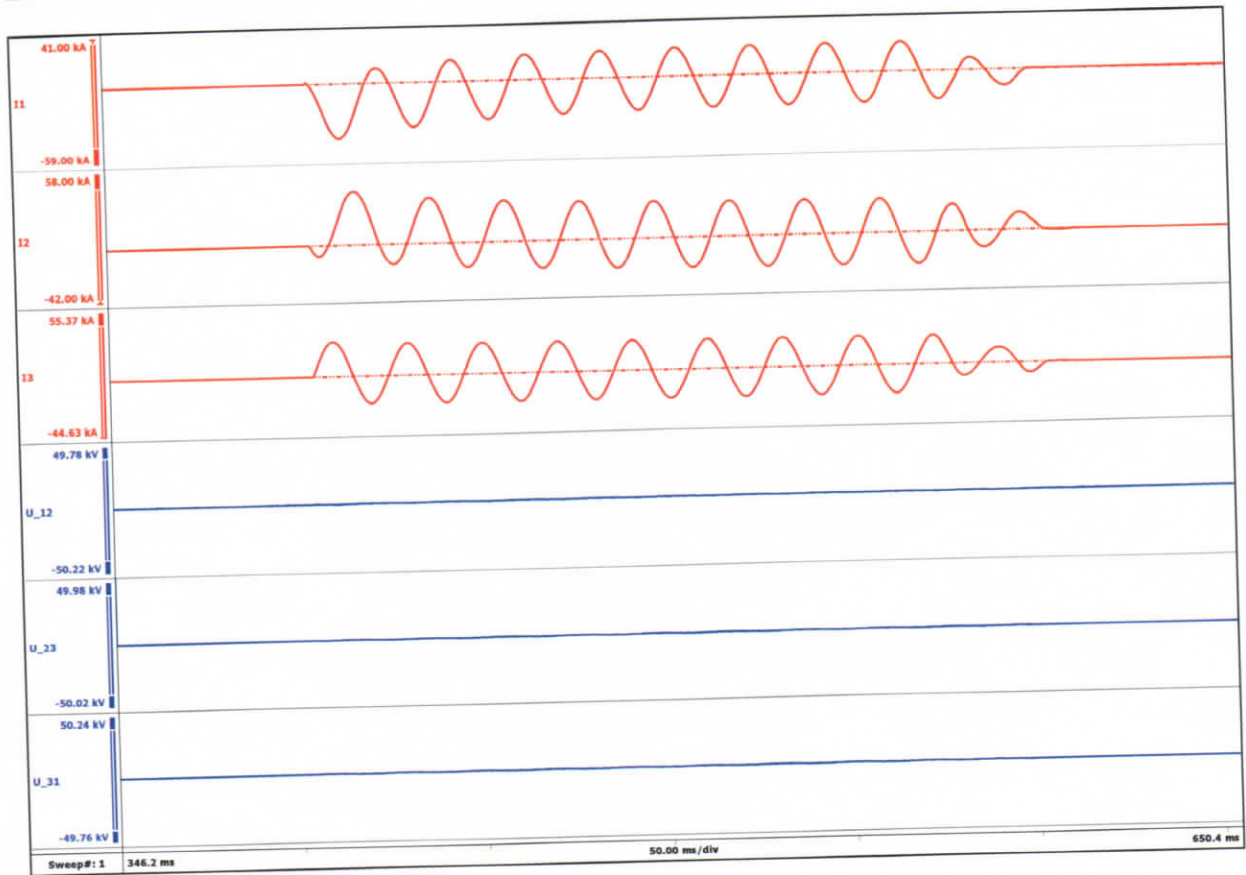




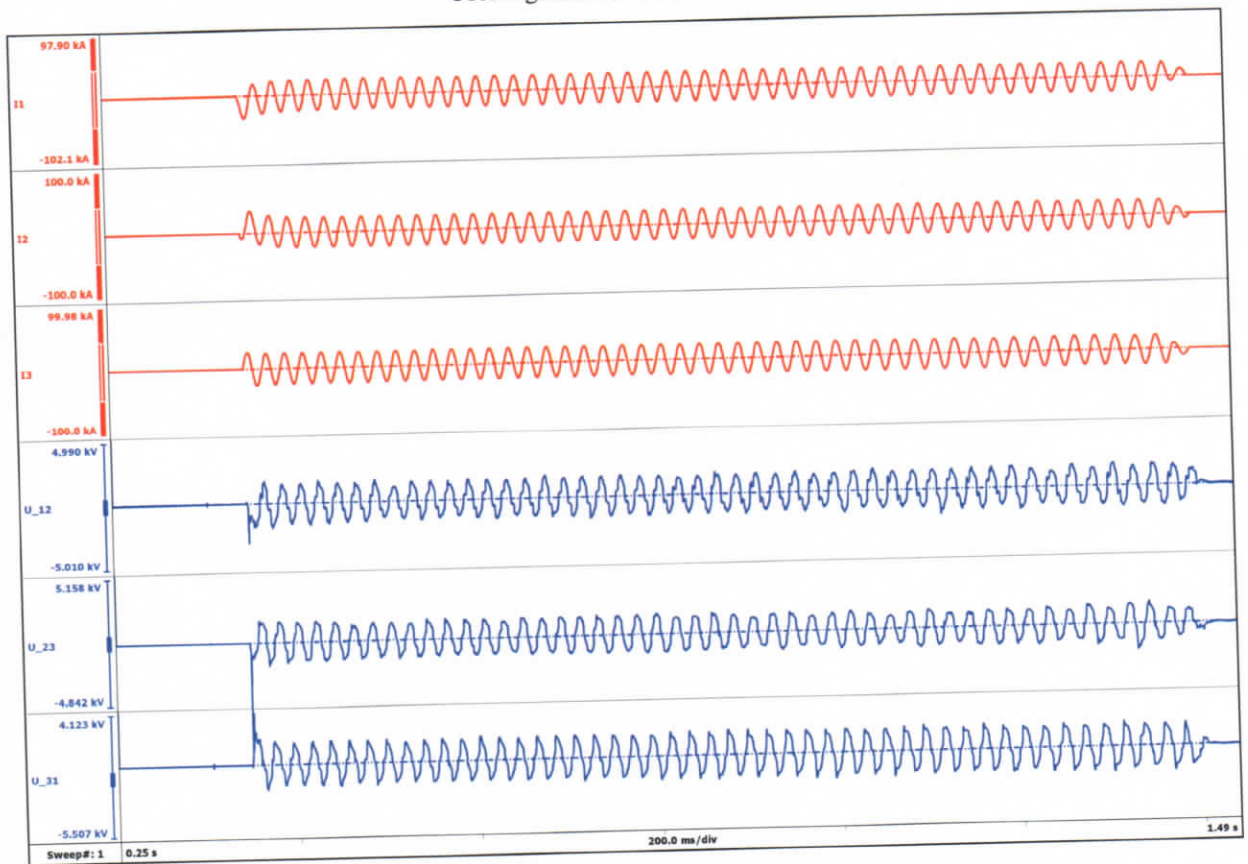




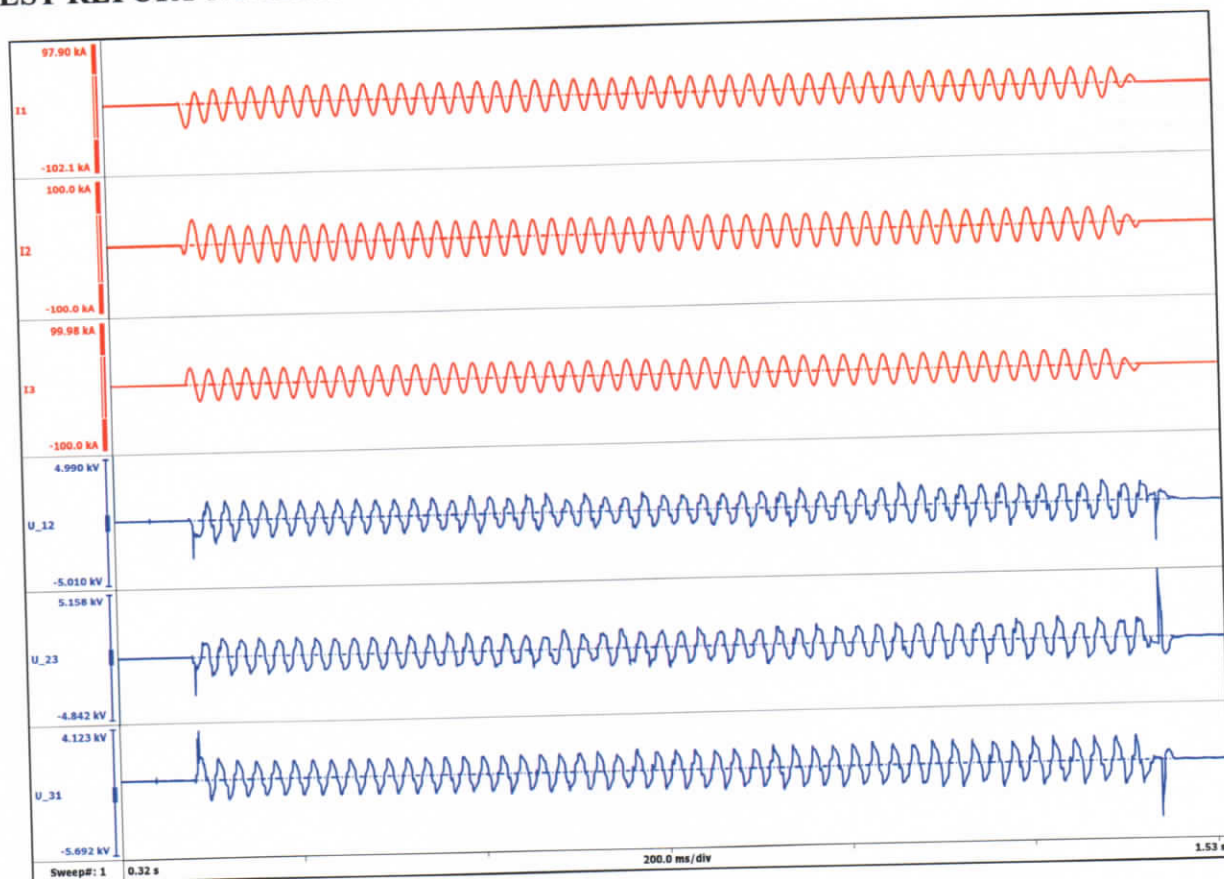




Oscillogram No. 96395 / 2017



Oscillogram No. 96396 / 2017



Oscillogram No. 96397 / 2017