



RESEARCH-DEVELOPMENT AND TESTING NATIONAL
INSTITUTE FOR ELECTRICAL ENGINEERING

ICMET CRAIOVA HIGH POWER DIVISION

HIGH POWER LABORATORY

"Ovidiu Rarinca"

200746-CRAIOVA, Blvd. DECEBAL, No.118A, ROMANIA
(Old address 200515-CRAIOVA Calea Bucuresti Nr. 144 ROMANIA)
Matriculation certificate: J16/312/1999, VAT number RO387 1599
Phone: (351) 402 427; Fax: (251) 415482; (351) 404 890;
E-mail: imp@icmet.ro

acreditat pentru
INCERCARE



SR EN ISO / CEI 17025: 2005
CERTIFICAT DE ACREDITARE
nr. LI 004 / 2007



TYPE TEST REPORT No. 10565

CUSTOMER: PANEL ELEKTRIK SAN. VE TIC. LTD. STI
Org. San. Böl. 17 Cad. No. 27 Yakapinar / Adana - Turkey

MANUFACTURER: PANEL ELEKTRIK SAN. VE TIC. LTD. STI
Org. San. Böl. 17 Cad. No. 27 Yakapinar / Adana - Turkey

TESTED PRODUCT: 36 kV, 630 A, 16 kA MMMH 36-04 Incoming/Outgoing Cubicle
with Circuit Breaker

REFERENCE STANDARD: IEC 62271-200/2003 Annex A

TEST PERFORMED: Internal arc test

TEST DATE: 04.08.2009

TEST RESULT: Passed the tests

Report has 16 pages and it is edited in 4 copies from which copy 1 for laboratory and copies 2, 3 and 4 for customer.

HEAD OF HIGH POWER DIVISION:
Dr. Eng. George Gurcanu



HEAD OF LABORATORY:
Eng. Constantin Iancu

DATE OF ISSUE: 29.09.2009

1. Results refer to test product only.
 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.
 3. Accreditation of the laboratory or any of its Test Reports issued under accreditation regime do not constitute or do not imply themselves an approval of the product by the accreditation body.
- © ICMET Craiova 2009/IM

TEST REPORT No. 10565

Content

1.	Identification of the test product	3
2.	Technical characteristics checked by tests	3
3.	Tests program	3
4.	Responsible for tests	3
5.	Present at the tests	3
6.	Test report documentation	4
7.	Data of testing and measuring circuit	4
8.	Internal arc test	5
9.	Test result	
	Annexes	6
	Photos	8
	Technical specification	10
	Drawings	14
	Oscillograms	

TEST REPORT No. 10565

1. IDENTIFICATION OF APPARATUS

Type	MMMH36-04
Serial number/year	04-2009-0005
Technical specification/Drawing	See pages 8 and 9 / See pages 10 to 13
Contract No.:	2266 / 01.06.2009
Product receiving date:	03.08.2009
Product condition at receiving:	New

2. TECHNICAL CHARACTERISTICS ESTABLISHED BY PRODUCER

Rated voltage	36 kV
Rated normal 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	1 s
IAC clasification	AFL
Internal fault current (Ik)	16 kA
Rated duration of internal fault current	1 s

3. TESTS PROGRAM

Tests were performed on MMMH36-01 and MMMH36-04 switchgears assembly as follows:

3.1 Three-phase current calibration test.

3.2 Internal arc test with: three-phase arc initiation point in the cables compartment on upper terminals of circuit breaker of MMMH36-04 switchgear serial no. 04-2009-0007 positioned in the right side of assembly

3.3 Internal arc test with three-phase arc initiation point in bus bar compartment on general bars. Three-phase applied voltage was made on input terminals of MMMH36-01 switchgear serial no. 01-2009-0008.

Test parameters were: $I_p = 40 \text{ kA}$, $I_k = 16 \text{ kA}$, $t_k = 1 \text{ s}$.

Arc initiation point was made with copper wire having 0.5 mm diameter.

Supply was made with copper cables of $3 \times 1 \times 240 \text{ mm}^2$

Switchgears assembly was placed in a special room with floor, two perpendicular walls and ceiling settled on a cable channel with dimensions of 1750 mm x 1400 mm x 600 mm.

The distances between switchgears assembly, walls and ceiling were:

- 100 mm from the lateral left wall
- 150 mm from the rear wall
- 4000 mm from the ceiling

The combined vertical and horizontal indicators (simulators) made of 140 g/m^2 cotton fabrics were placed in the front and the right side of the switchgears assembly at 300 mm distance corresponding to accessibility class A.

Tests were performed according to own procedure PT 03.07.

4. RESPONSIBLE FOR TESTS: Eng. Ilie Sbora

5. PRESENT AT THE TESTS: Mr. Cenk Yuzereroğlu from PANEL ELEKTRİK - Turkey

6. TEST REPORT DOCUMENTATION

Oscillograms	3;	Tables	3;
Photos	4;	Drawings	4.

7. DATA OF TESTING AND MEASURING CIRCUIT

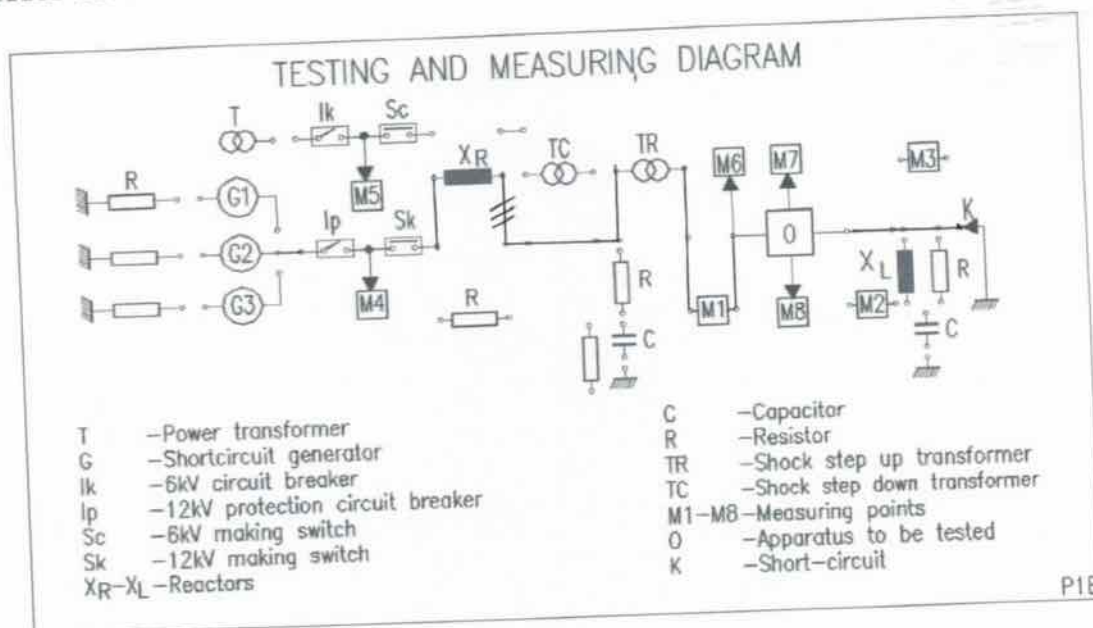


Table 1

Phases number	3
Source/ connection	G2 / Δ
Transformer/Rate	TR 4, 5, 6 / 1.07
Earthing	Source
	Apparatus
	Net earthing connection
Reactor [Ω]	0.6
Power factor	<0.15
M1 - Apparatus current - Rogowski coils 30 kA/V	
M4 - Supply source voltage - Voltage transformer 15000 V/100 V	
M6 - Apparatus voltage - Voltage transformer 35000/100V	
M8 - Data acquisition system TRAS 10-12	

8. INTERNAL ARC TEST

The test results are presented in table 2.

Table 2

Oscillogram No.	URS UST UTR [kV]	I _{pR} I _{pS} I _{pT} [kA]	I _{tR} I _{tR} I _{tT} [kA]	t _t [sec.]	I _{t med} [kA]	DURS DUST DU _{TR} [V]	Remarks
76584/2009	6.1 6.1 6.1	41 - -	16.0 16.0 16.4	0.2	16.13	- - -	Current calibration
76586/2009	6.3 6.3 6.3	37.9 - -	16.0 16.4 16.1	1	16.16	780 1100 887	Test on cables compartment
76587/2009	6.3 6.3 6.3	37.8 - -	16.0 16.3 16.2	1	16.16	1010 992 1100	Test on bus bar compartment

Measurements were performed with expanded uncertainty of: 1% for voltage; 1% for current; 0.5% for time and the confidence level P = 95 %.

TEST REPORT No. 10565

8.1. Symbols used in tables and oscillograms

$I_R I_S I_T$ = Short-circuit current
 $I_{pR} I_{pS} I_{pT}$ = Peak values of short-time withstand currents on the phases R, S, T.
 $I_{tR} I_{tS} I_{tT}$ = R.m.s. values of short - time withstand currents on the phases R, S, T.
 t_t = The duration of short - circuit
 $I_{t \text{ med}}$ = Effective current mean value
 $DURS, DUST, DUTR$ = Voltage drop on arc
 URS, UST, UTR = No-load applied voltage

8.2 Remarks

- Aspect of MMMH36-04 and MMMH36-01 switchgears assembly and simulators in the test circuit before the test in the cables compartment is presented in photo 1.
- Aspect of MMMH36-04 and MMMH36-01 switchgears assembly and simulators after the test in the cables compartment is presented in photo 2.
- Aspect of MMMH36-04 and MMMH36-01 switchgears assembly and simulators in the test circuit before the test in the bus bar compartment is presented in photo 3.
- Aspect of MMMH36-04 and MMMH36-01 switchgears assembly and simulators after the test in the cables compartment is presented in photo 4.
- During the tests:
 - the doors did not opened;
 - the indicators did not ignite;
 - no detached parts of the switchgears assembly were observed;
 - the diaphragms for pressure relief positioned in the rear of the switchgears worked correctly

8.3 Assessment of the test result

Table 3

Criterion	Result
1. The doors, covers etc. correctly secured do not open	Fulfilled
2. Parts which may cause a hazard do not fly off	Fulfilled
3. Arcing does not cause holes to develop in the freely accessible external parts of the enclosure as a result of burning or other effects	Fulfilled
4. The indicators do not ignite	Fulfilled
5. All earthing connections are still effective	Fulfilled

9. TEST RESULT: PASSED THE TEST



Photo 1 - Aspect of MMMH36-04 and MMMH36-01 switchgears assembly and simulators in the test circuit before the test in the cables compartment



Photo 2 - Aspect of MMMH36-04 and MMMH36-01 switchgears assembly and simulators after the test in the cables compartment



Photo 3 - Aspect of MMMH36-04 and MMMH36-01 switchgears assembly and simulators in the test circuit before the test in the bus bar compartment



Photo 4 - Aspect of MMMH36-04 and MMMH36-01 switchgears assembly and simulators after the test in the cables compartment



ELEKTRİK SANAYİ VE TİCARET LTD. ŞTİ.

MMM36-04 INCOMING / OUTGOING CUBICLE WITH CIRCUIT BREAKER	
Rated Voltage	36 kV
Rated power frequency withstand voltage (1 min)	
Phase to earth and phase to phase	70 kV
At isolating distance	80 kV
Rated Lightning impulse withstand voltage 1.2/50ms	
Phase to earth and phase to phase	170 kV
Across Interrupter	195 kV
Rated frequency	50/60 Hz
Rated current	630 A
Rated peak withstand voltage	40 kA
Rated short-time withstand current (1s)	16 kA
Switch	
Brand	ULUSOY
Type	DSG36
Serial Number	
Operating Pressure	0.5 Bar
Min. Operating Pressure	0.4 Bar
Rated Voltage	36 kV
Rated Frequency	50 / 60 Hz
Rated current	630 A
Circuit Breaker	
Brand	DEMİTAŞ
Type	DSSAG-3D
Serial Number	
Rated Voltage	36 kV
Rated Frequency	50 / 60 Hz
Rated current	630 A
Operating Pressure	2 Bar
Min. Operating Pressure	1.9 Bar
Grounding Disconnecter	
Brand	ULUSOY
Type	UET36-1
Rated short-time withstand current (1s)	16 kA
Rated short-circuit making current (peak)	40 kA
Isolator with capacitive sensor	
Brand	ULUSOY
Type	UKAP36

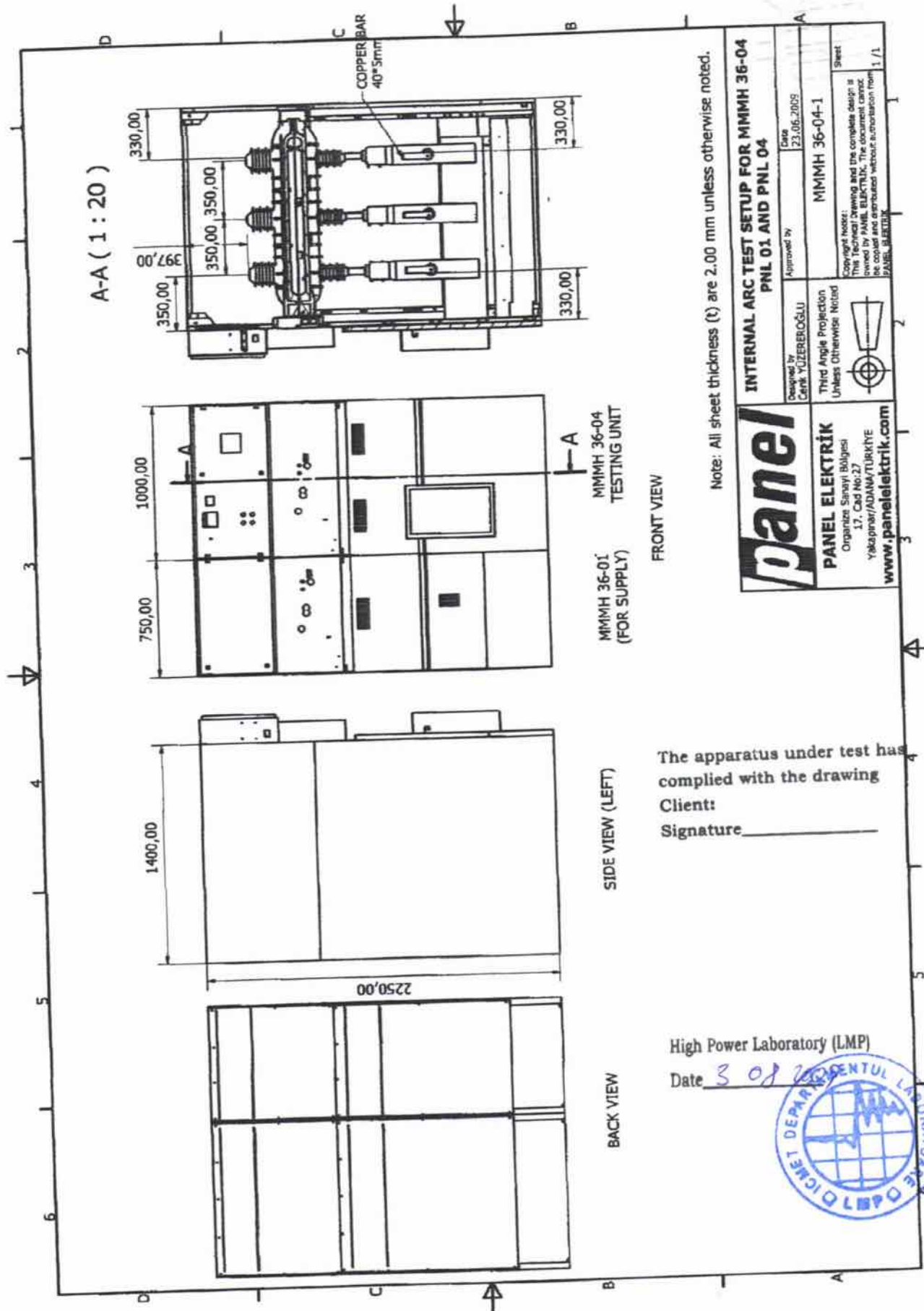
Address: H.Sabancı Organize San. 17 Cad. No: 27 ADANA/TURKEY
 Tel: 00 90 322 394 36 97
 Fax: 00 90 322 394 37 00
www.panelelektrik.com

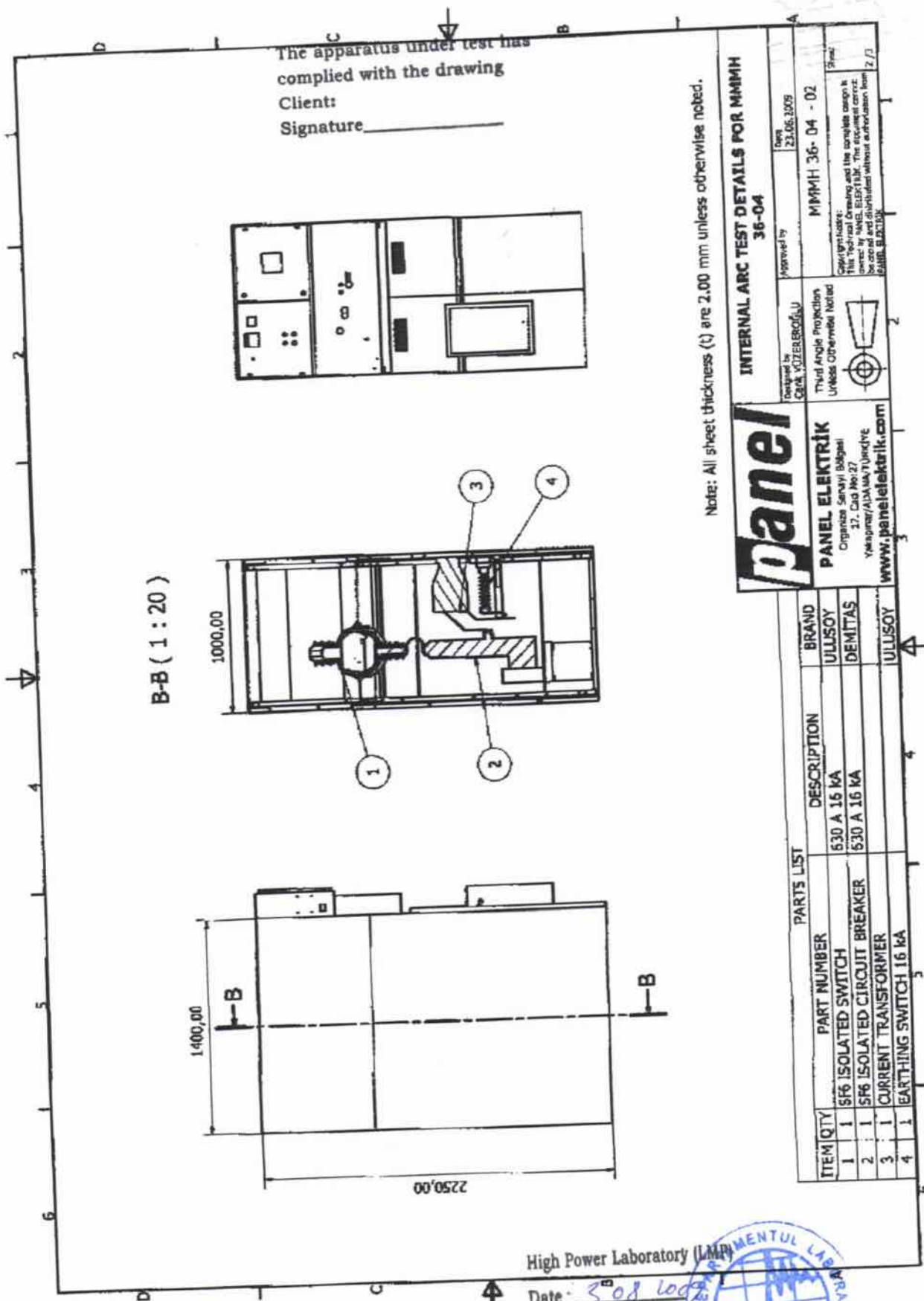


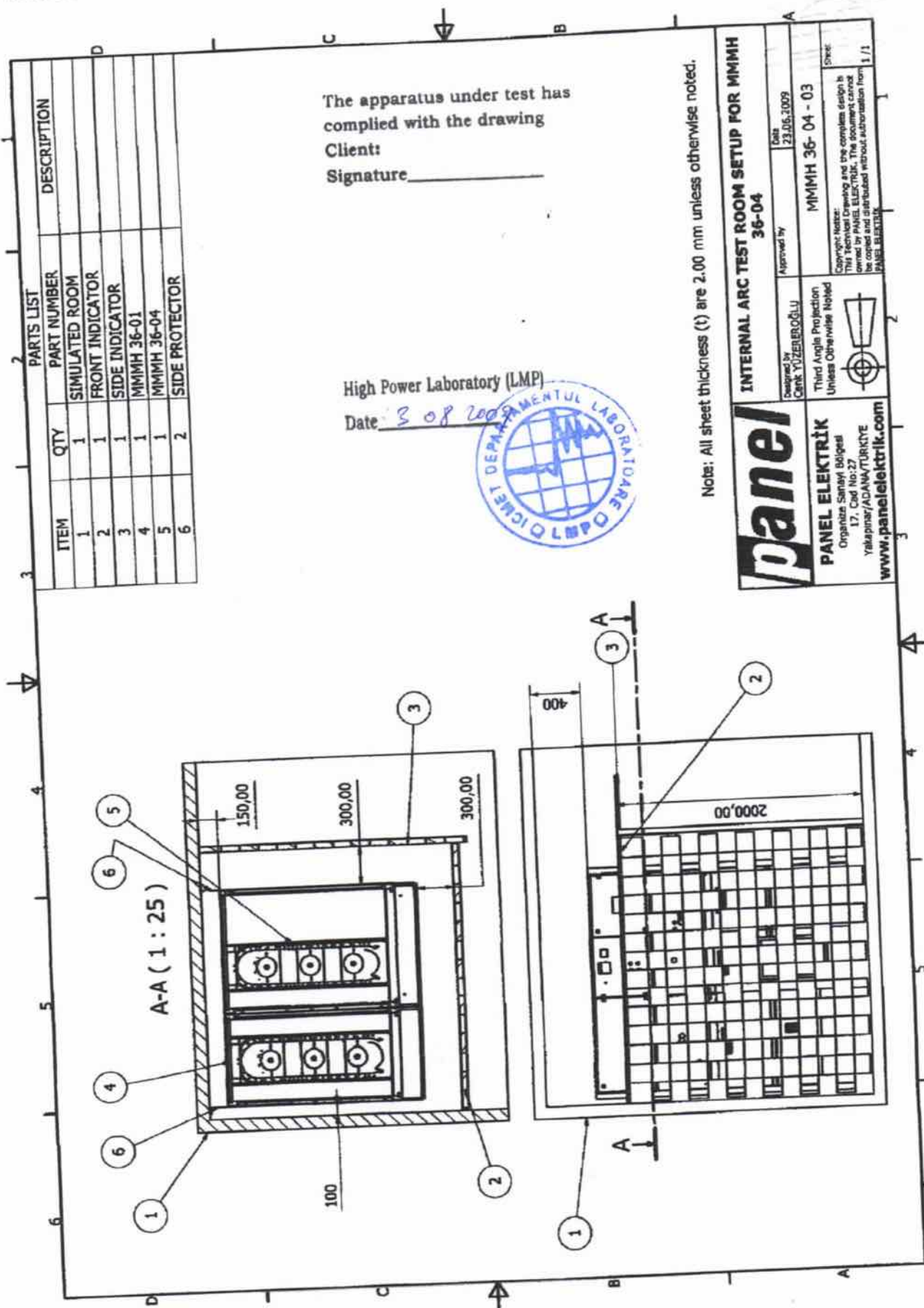
ELEKTRİK SANAYİ VE TİCARET LTD. ŞTİ.

Current Transformer	
Brand	ESİT
Type	CTM30
Transform ratio	600/5
In	400
Serial Number R	
Serial Number S	
Serial Number T	

Address: H.Sabancı Organize San. 17 Cad. No: 27 ADANA/TURKEY
Tel: 00 90 322 394 36 97
Fax: 00 90 322 394 37 00
www.panelelektrik.com







The apparatus under test has
complied with the drawing
Client: _____
Signature: _____

High Power Laboratory (LMP)

Date 3082009



TEST SETUP SINGLE LINE DIAGRAM

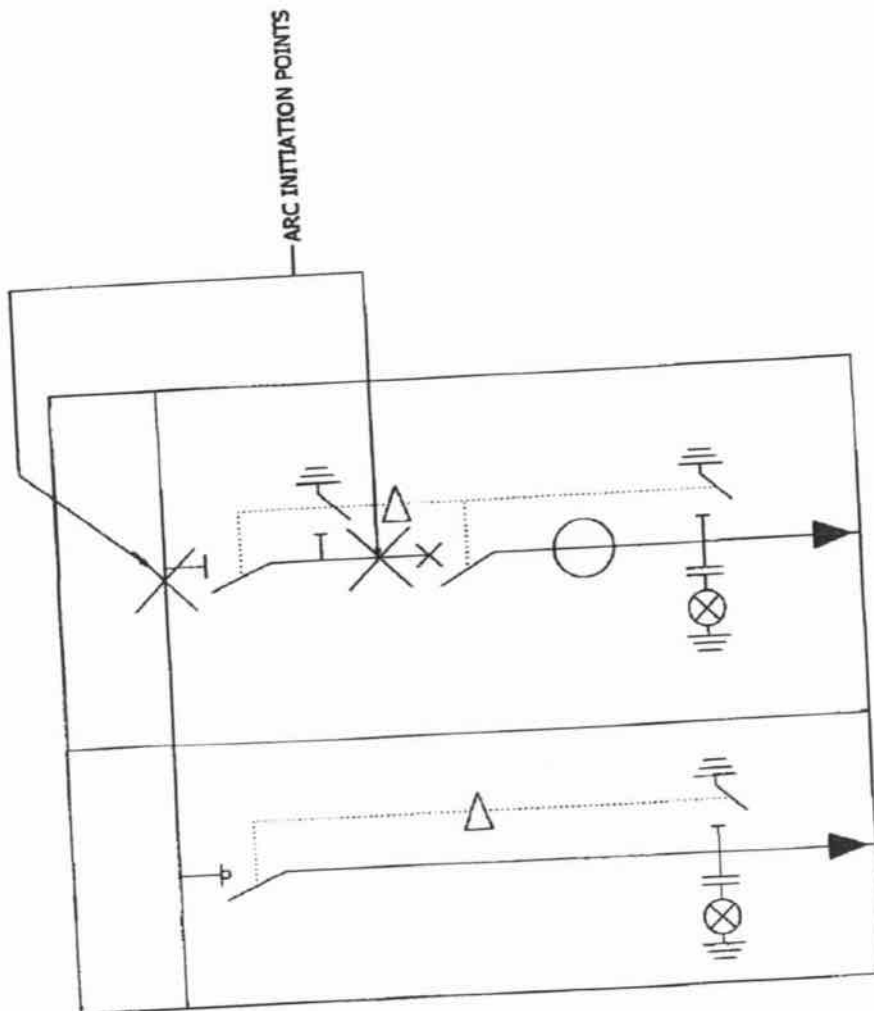
Date 25.06.2009

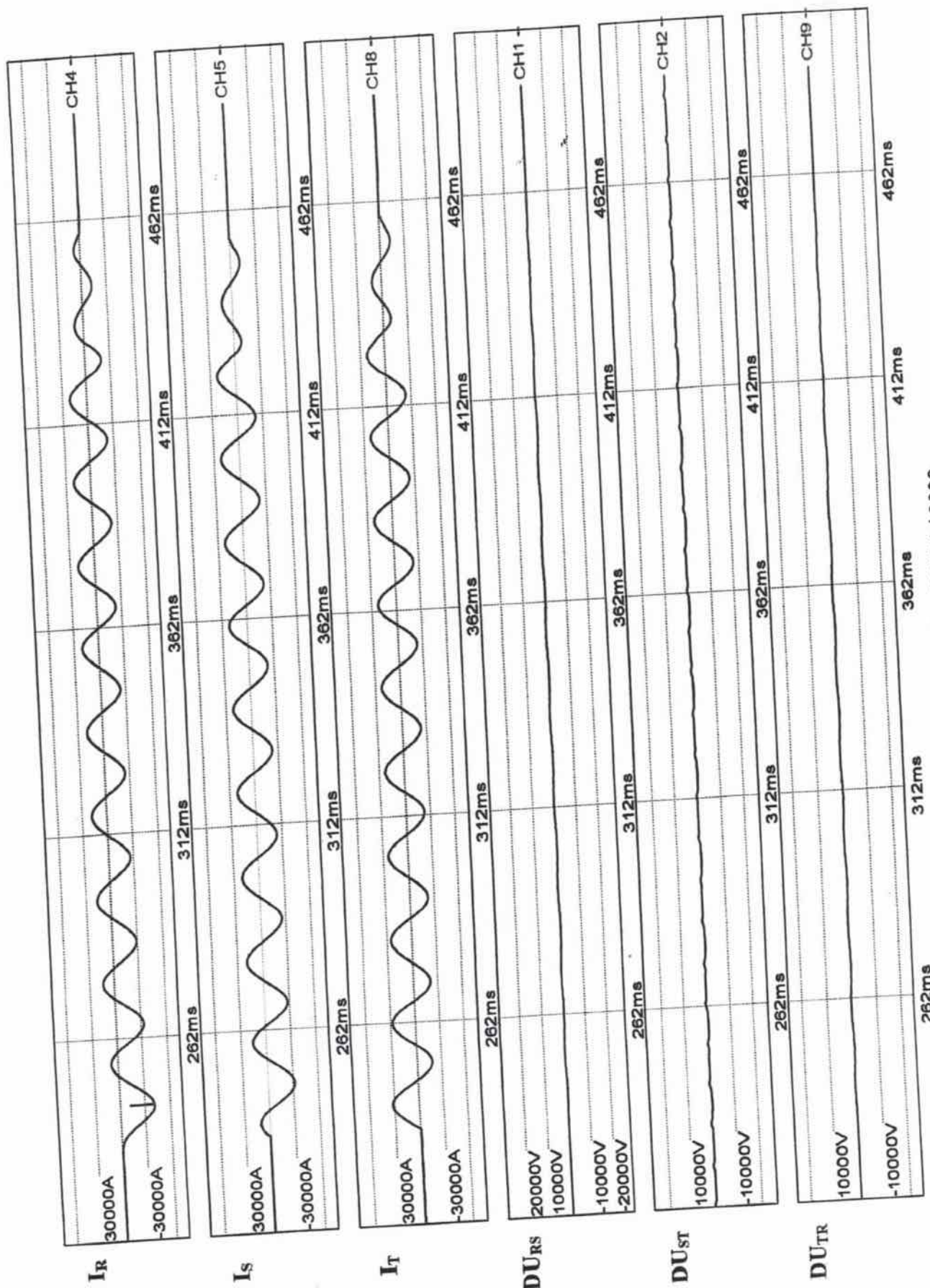
Approved by

MMM 36-04 - 04

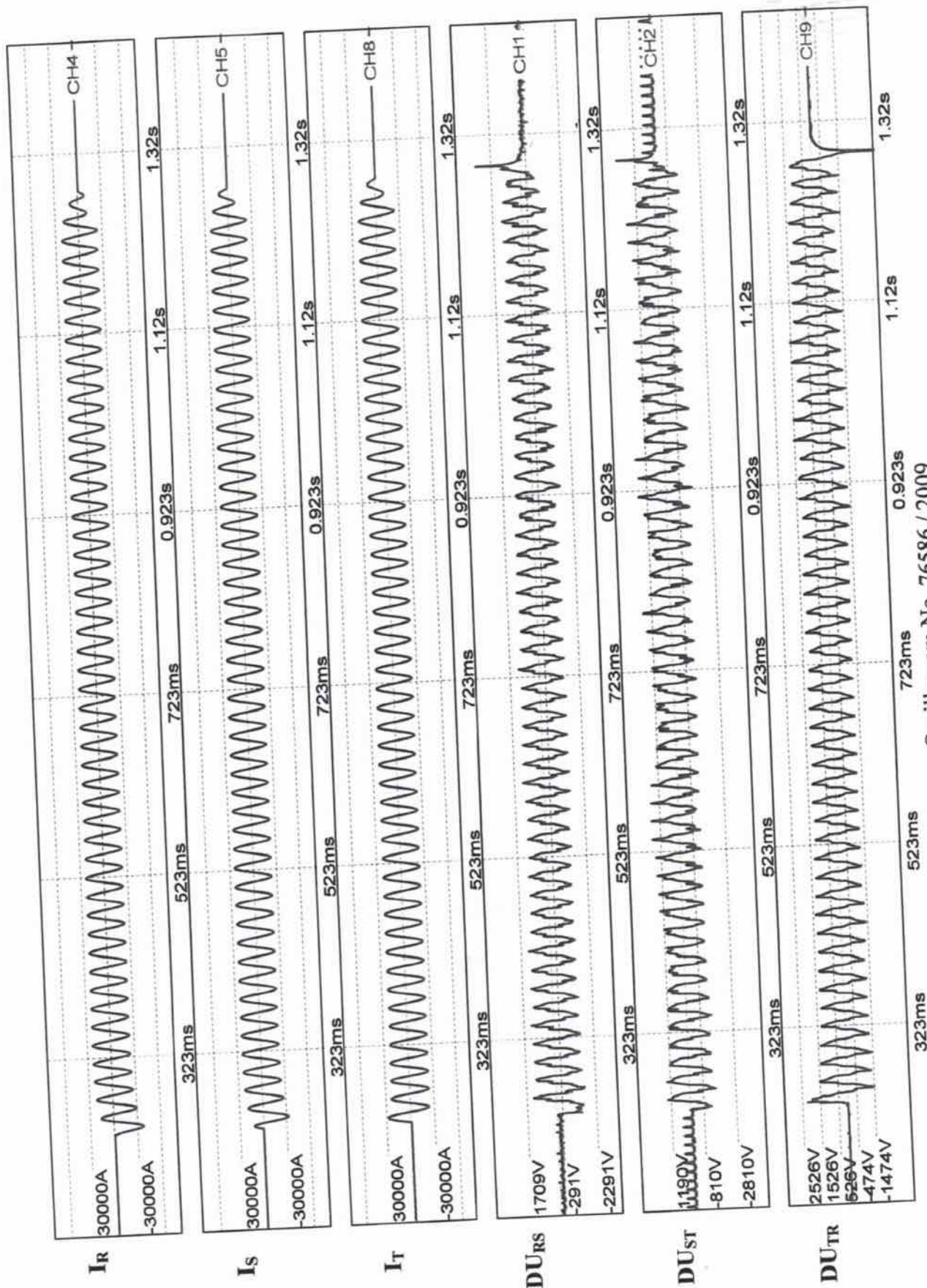
Sheet

1/1

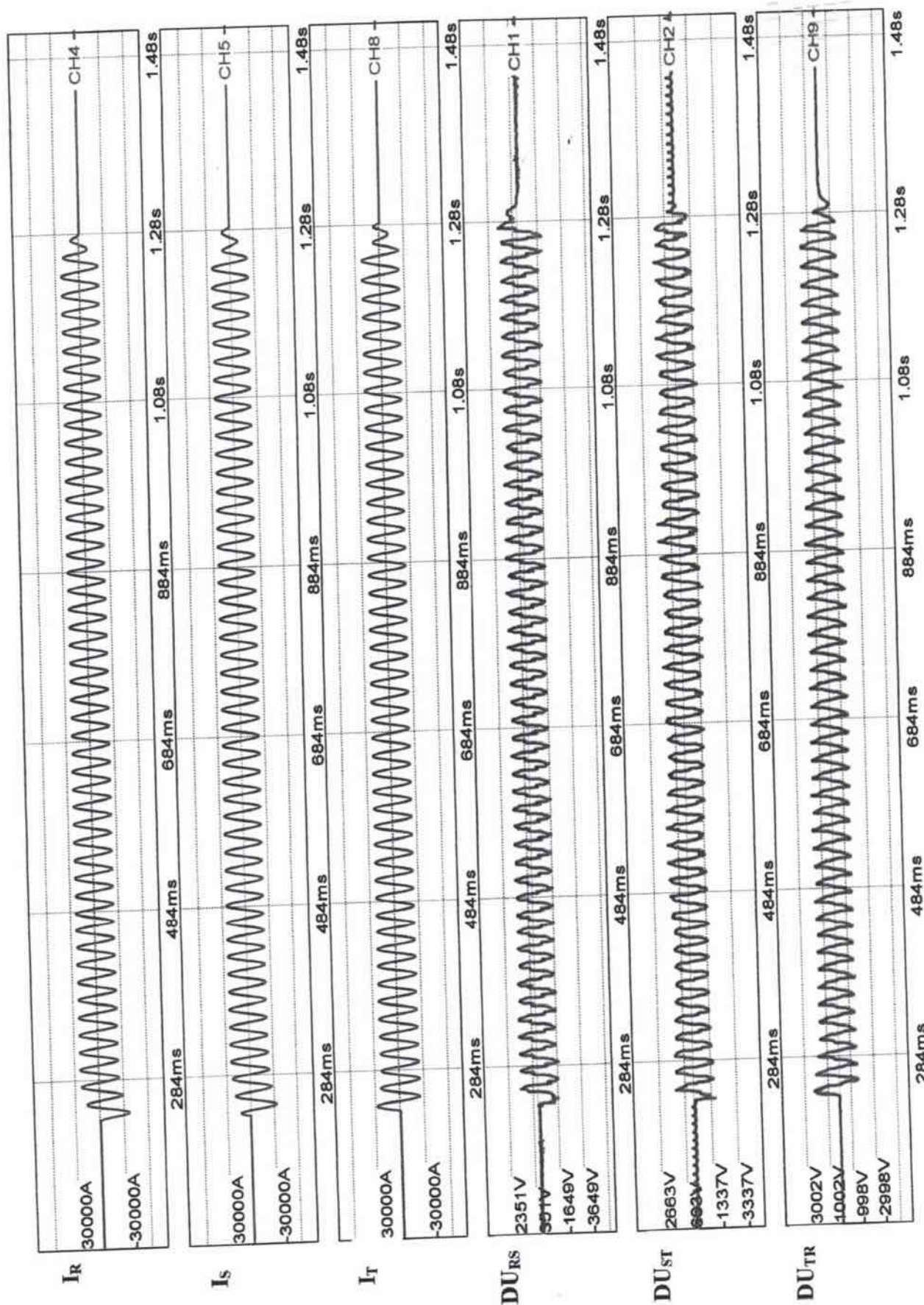
Designed by
Cenk YUZERERÇALIThird Angle Projection
Unless Otherwise NotedCopyright Notice:
This Technical Drawing and the complete design is
owned by PANEL ELEKTRİK. The document cannot
be copied and distributed without authorization from
PANEL ELEKTRİK.**panel****PANEL ELEKTRİK**Organize Sanayi Bölgesi
17. Cad No:27
Yakapınar/ADANA/TÜRKİYEwww.paneelektrik.comMMM 36-02
TESTING UNITMMM 36-01
UNIT FOR SUPPLY



Oscillogram No. 76584 / 2009



Oscillogram No. 76586 / 2009



Oscillogram No. 76587 / 2009