



RESEARCH-DEVELOPMENT AND TESTING NATIONAL
INSTITUTE FOR ELECTRICAL ENGINEERING

ICMET CRAIOVA HIGH POWER DIVISION

HIGH POWER LABORATORY

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DAT-P-266/07-20

INCERCARE



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

TEST REPORT No. 10563

CUSTOMER: PANEL ELEKTRIK SAN VE TIC LTD. STI
Organize Sanayi Bolgesi 17 Cad No. Yakapinar/ADANA/TURKEY

MANUFACTURER: PANEL ELEKTRIK SAN VE TIC LTD. STI
Organize Sanayi Bolgesi 17 Cad No. Yakapinar/ADANA/TURKEY

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

PRODUCT:

REFERENCE STANDARD: IEC 62271-200 / 2003, cl.6.4 and 6.5

TEST PERFORMED: Measurement of the resistance of the main circuit
Temperature-rise test

TEST DATE: 03.08.2009

TEST RESULT: Passed the test

Report has 13 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 Corcanu

HEAD OF LABORATORY:

Eng. Constantin Iancu

DATE OF ISSUE:

30.09.2009

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 belong to.
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1. IDENTIFICATION OF TEST PRODUCT

1.1 Type	Cubicle tested
1.2 Serial number/year	MMMH-36-04
1.3 Technical specification / Drawing	04-2009-0004
1.4 Contract No.:	See page 8,9 / See page 10 to 13
1.5 Product receiving date:	2266/01.06.2009
1.6 Product condition at receiving:	06.05.2009
	New.

2. TECHNICAL CHARACTERISTICS ESTABLISHED BY MANUFACTURER

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
Duration	1 s

3. TESTS PROGRAM

- 3.1 Measurement of the resistance of the main circuit before and after temperature-rise test
- 3.2 One temperature rise test on cubicle type MMMH-36-04. s.n.04-2009-0004 at $I = 630A$, 50Hz in assembly with cubicle for supply type MMMH-36-07 s.n.07-2009-0003 and cubicle type MMMH-36-07 s.n.07-2009-0004 see photo from page 7 and drawing from page 10.

The tests are performed according to own procedure PT 03.05.

4. RESPONSIBLE FOR TESTS: Eng. Ilie Sbora**5. PRESENT AT THE TESTS:****6. TEST REPORT DOCUMENTATION**

Oscillograms	-;	Tables	2;
Photos	1;	Drawings	4;

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7. MEASUREMENT OF RESISTANCE ON THE MAIN CIRCUIT

The resistance of the main circuit was measured with digital micro ohmmeter type OMICRON CPM500 with accuracy $\pm 0.2\%$. Results are presented in table 1.

Table 1

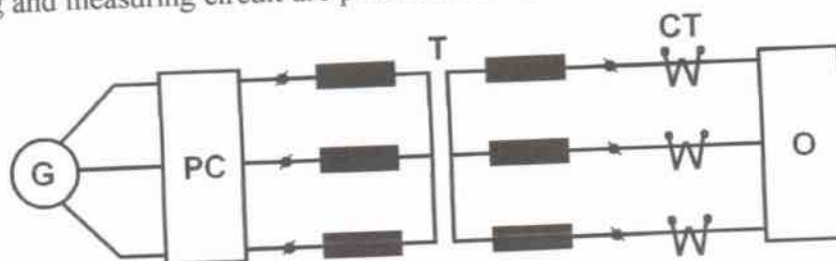
Resistance	Phase R	Phase S	Phase T	
$R_1 [\mu\Omega]$	472	479	466	Resistance before temperature rise test
$R_2 [\mu\Omega]$	477	474	473	Resistance after temperature rise test
$\Delta R [\%]$	+1	-1	+1.5	

The measurements were performed with expanded uncertainty of: 2.5% for resistance and the confidence level $P = 95\%$. The environment temperature was 30.2°C before temperature rise test and 30.4°C after temperature rise test

8. TEMPERATURE RISE TEST

8.1 Data of testing and measuring circuit

Data of testing and measuring circuit are presented in fig. 1.



- G - Generator type GSAM – 390 kVA, 400 V, 50 Hz
- PC - Connections panel
- T - Adapting transformer made of 3 single-phase transformers of 400 / 25V, 10 kA, 50 Hz
- CT - Current transformers type CIRSO– 2000 / 5 A
- O - Object to be tested

Fig. 1 – Test diagram for current paths temperature-rise test

8.2 Results obtained on test

The three-phase temperature rise test was performed by passing a current of 630 A / 50 Hz on Cubicle type MMMH 36-04 s.n. 04-2009-0004, in assembly with Cubicle type MMMH 36-07 s.n. 07-2009-0003 for supply and no current was passed cubicle type MMMH 36-07 s.n. 07-2009-0003 until the temperature variation did not exceed 1°C per hour.

Supply was made on incomings terminals of Cubicle type MMMH 36-07 s.n. 07-2009-0003 by means of copper flexible cable of $3 \times (1 \times 400) \text{ mm}^2$ cross-section and outgoings terminals of Cubicle type MMMH 36-04 s.n. 04-2009-0004 were short circuit with copper bar of $2 \times 80 \times 10 \text{ mm}^2$.

Temperatures were measured only in cubicle type MMMH 36-04 s.n. 04-2009-0004 using the temperatures measurement computerized system type J thermocouple Keithley Multimeter Integra 2700. Measurement points are presented in fig. 2

Environment temperature was measured in three points equally distributed around the assembly at half height and approximately 1 m distance of it. Values of the measured temperatures are presented in table 2.

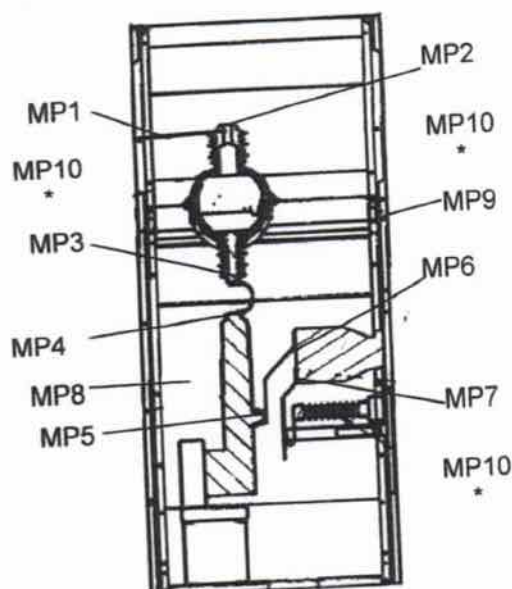


Fig. 2 – Placement of the temperature-rise test measuring points

Table 2

No. of MP	Phase	Place of the measurement points MP	Nature of the part	Material	Maxim value of temperature rise at ambient air temperature air not exceeding 40°C [K]	Final temperature for $\Delta t \leq 1K/h$ [°C]	Temperature rise [K]	Temperature rise reserve [K]
MP1	R	Input terminals	Connection	Cu / Cu	50	63.27	31.88	18.12
	S					62.83	31.44	18.56
	T					62.54	31.15	18.61
MP2	R	Upper Terminal SF6 Isolated Switch	Connection	Cu / Cu Ag	75	62.92	31.53	43.47
	S					64.46	33.07	41.93
	T					63.06	31.67	43.33
MP3	R	Lower Terminals SF6 Isolated Switch	Connection	Cu Ag /Cu	75	79.57	48.18	26.82
	S					79.15	47.76	27.24
	T					77.33	45.94	29.06
MP4	R	Upper Terminals of Circuit Breaker	Connection	Cu-Ag /Cu-Ag	75	83.23	51.84	23.16
	S					83.60	52.21	22.79
	T					82.15	50.76	24.24
MP5	R	Lower Terminals of Circuit Breaker	Connection	Cu-Ag/Cu	75	73.86	42.47	32.53
	S					69.06	37.67	37.33
	T					73.18	41.79	33.21
MP6	R	Upper Terminals of Current Transformer	Connection	Cu /Cu	50	80.36	48.97	1.03
	S					77.99	46.60	3.40
	T					77.78	46.39	3.61
MP7	R	Lower Terminals of Current Transformer	Connection	Cu /Cu	50	68.37	36.97	13.03
	S					71.06	39.67	10.33
	T					71.05	37.66	12.34
MP8	-	CircuitBreaker compartment	Environment	-	-	51.07		
MP9	-	Handle	Insulator	-	30	33.59	2.20	27.80
MP10	-	Environment temperature	Environment	-	-	31.39 ¹⁾	-	-

1) Average value of 3 measurement points

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The measurements were performed with expanded uncertainty of: 3% for temperature and the confidence level $P = 95\%$.

8.3 Remarks: Aspect of the assembly Cubicles in the test circuit is presented in photo from page 7.

9. TEST RESULT: PASSED THE TEST

Photo



Aspect of assembly cubicles in the test circuit



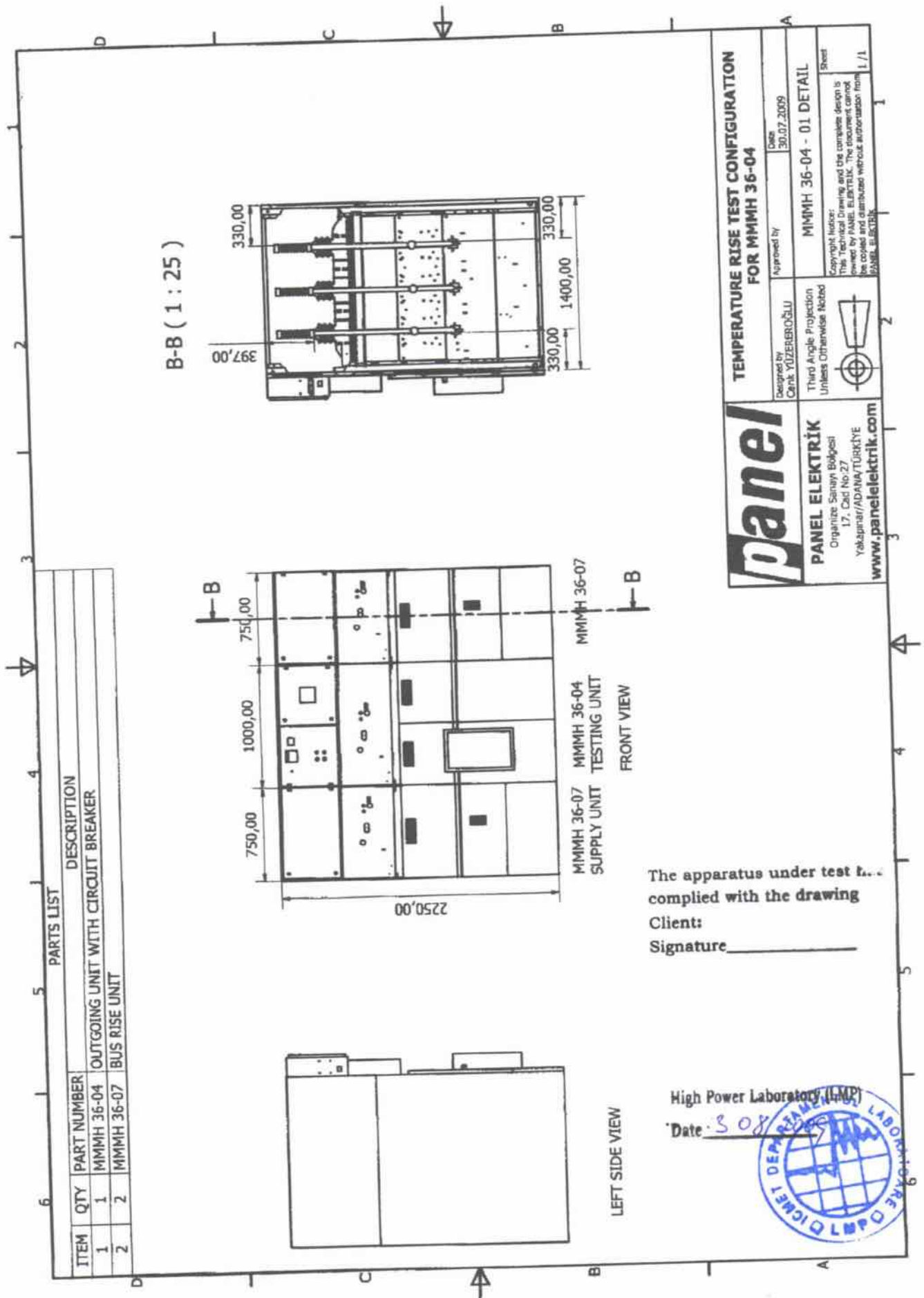
MMM36-04 INCOMING / OUTGOING CUBICLE WITH CIRCUIT BREAKER	
Rated Voltage	36 kV
Rated power frequency withstand voltage (1 min)	
Phase to earth and phase to phase	70 kV
At isolating distance	80 kV
Rated Lightning impulse withstand voltage 1.2/50ms	
Phase to earth and phase to phase	170 kV
Across Interrupter	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	D55AG-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
 E-mail: panel@panelakademi.com.tr

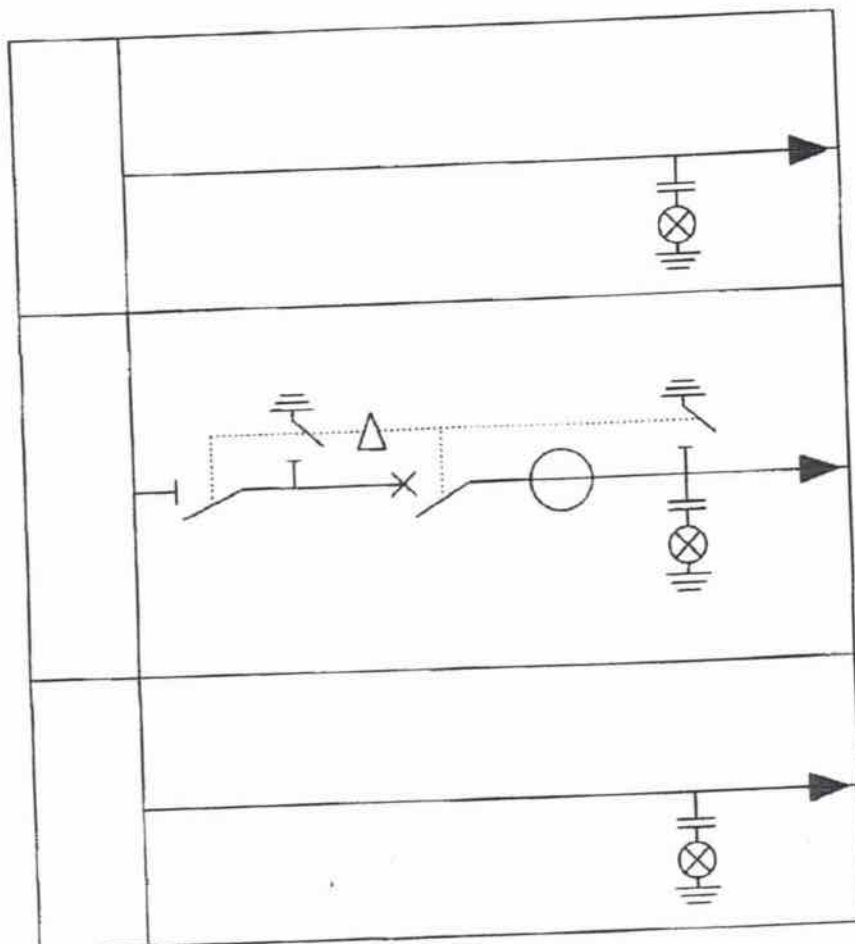


Current Transformer	
Brand	ESİT
Type	CTM30
Transform ratio	600/5
In	400
Serial Number R	
Serial Number S	
Serial Number T	

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.panelenerjiakademi.com



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



MMMH 36-07

MMMH 36-04
TESTING UNITMMMH 36-07
UNIT FOR SUPPLY

panel

PANEL ELEKTRİK

17. Cad No:27

www.panelektrik.com

Designed by

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Date
30.07.2009

MMMH 36 - 04 - 02

Third Angle Projection
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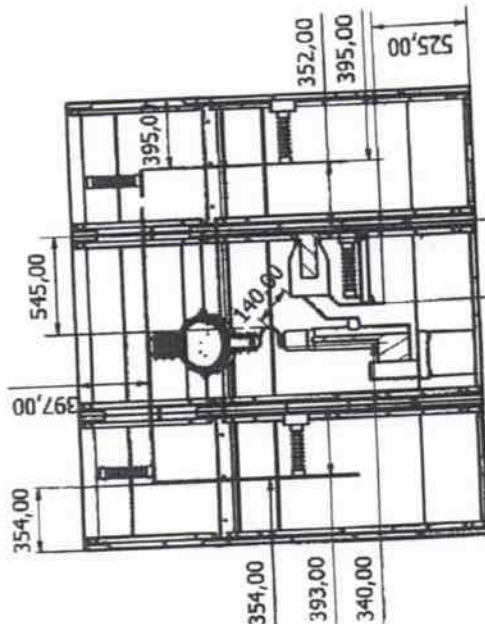
High Power Laboratory (LMP)

Date 30.08.2009



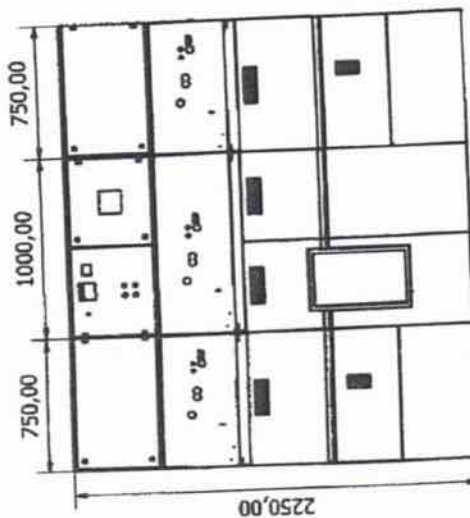


A-A (1 : 25)



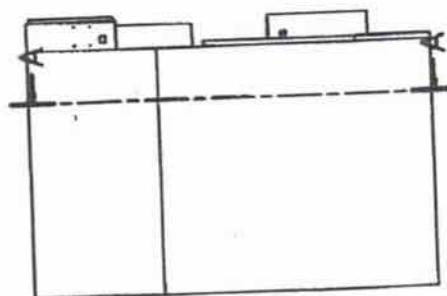
MMMh 36-07
SUPPLY UNIT TESTING UNIT

SECTION VIEW



MMMh 36-07
SUPPLY UNIT TESTING UNIT

FRONT VIEW



LEFT SIDE VIEW

TEMPERATURE RISE TEST CONFIGURATION
FOR MMMH 36-04

panel

PANEL ELEKTRİK
Organize Sanayi Bölgesi
17. Cad No:27
Yakapınar/ADANA/TÜRKİYE
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Cenk YÜZERERÖĞÜLÜ

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MMMh 36-04-01

Sheet
1 / 1

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