

MAVIR-OVRAM-JKV-0253-00-2012-11-07

Hungarian Transmission System Operator Company Ltd. (MAVIR Zrt.)  
Relay Protection and Telemechanics Department (OVRAM)  
Relay Protection Laboratory

Testing laboratory accredited by the Hungarian Accreditation Board  
(NAT) with reference number NAT-1-0967/2012.

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## Test Report

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The test results apply only to the equipment actually tested!

Report No:	26/2012
No of pages:	9
Equipment under test (EUT):	MAB3 control equipment S/N: 1241020000017
Manufacturer:	Infoware ZRt. 2310 Szigetszentmiklós, Határ út 22.
Site of tests:	Laboratory of OVRAM
Date of tests:	16-17 October 2012
Test report issued:	26 October 2012
Tests performed :	Mr. Zoltán Nemes Mr. Jenő Hanti 
Tests supervised by:	Mr. Zoltán Hirsch 

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## 1. Test equipment used

Function	Manufacturer	Type	Serial No
insulation tester	Associated Research	HY POT™ II 3565D	9093218
insulation resistance meter	METREL	TeraOhm 5kV	10537
impulse voltage tester	Haefely	P6R	082 773 – 09
multi-function EMC test generator	EM Test	UCS 500 M4	0304 – 45
coupling network	EM Test	CNV 504N5.3	V1143110998
DC power supply	Relé GM	UNT 1	840910
oscillatory wave generator	EM Test	OCS 500 M6	0104 – 07
electrostatic discharge generator	EM TEST	dito	reg. no: 08225
conducted disturbance generator	EM Test	CWS 500	0701 – 01
coupling/decoupling network	EM Test	CDN-M3-1	0006235C
coupling/decoupling network	EM Test	CDN-S9	000651001009
GTEM cell	T-Network	Piramis 3	01/2010
signal generator	HAMEG	HM 8135	061010034
amplifier	Frankonia	FLH-50A	1090
amplifier	OPHIR	5142F	1019
directional coupler 0,01-1000 MHz	TESEQ	DPC 0100A	29405
directional coupler 800-3600 MHz	BIRD	100-CC-FFN-30	-
power transducer	NARDA	PM 6630	000WX00619
field probe 0,1-3000 MHz	NARDA	PMM EP 330	101WX9057
optical decoupler	NARDA	PMM OR03	020WX00911
operation and calibration software	T-Network	RFI_SW_PM_V3_1	-
analog multiméter	Ganz	GANZUNIV-1	21126
analog multiméter	Ganz	GANZUNIV-1	65212

## 2. EUT technical data

Relevant technical data provided by the manufacturer:

Nominal aux. voltage: 230 V AC, 220 V DC

MAB3		S/N:	1241020000017
1. CPU912	Central processing unit		1214011200093
2. PSU25	230VAC/220VDC aux. power supply unit		991000041
3. DI08	8 ch input unit		1225010050015
4. DI16	16 ch input unit		1228011150241
5. PQT3-v2	analog input unit		1135059990053

Test equipment:

- Dell latitude notebook type: D530 S/N: FFS814J
- vedst\_ns sw ver.: 1.42b172

## 3. Tests performed

During the tests the ambient temperature in the laboratory was 24,9 °C and the relative humidity was 37,2 %.

### 3.1.3. Insulation resistance measurements

Independent circuits tested:

aux. power supply input,  
binary inputs,  
CT inputs,  
VT inputs

The measured Insulation resistance values were above 800 M $\Omega$  at each standard testing variations.

The uncertainty of the test: 0,5 M $\Omega$

Test result: passed

### 3.2. Electromagnetic disturbance (EMC) tests

During the EMC tests both EUT's were energized with their nominal aux. power supply voltage. The relay output and binary input function was checked during and after the tests.

#### 3.2.1. 1 MHz damped oscillatory wave test according to MSZ EN 61000-4-18:2007

Independent circuits tested:

aux. power supply input,  
binary inputs,  
CT inputs,  
VT inputs

Test voltage: 2,5 kV in common mode, 1 kV in differential mode

Disturbance duration: 2 s

The uncertainty of the test: 38 V

Test result: passed

### 3.2.2. Electrostatic discharge tests according to MSZ EN 61000-4-2:2009

Test method:

contact discharge to the metallic parts of the front panel  
test voltage: 6 kV

The uncertainty of the test: 420 V

Test result: passed

### 3.2.3. Radiated electromagnetic field immunity tests according to MSZ IEC 61000-4-3:2006

Test field intensity: 10 V/m

Frequency ranges: 80 MHz – 1 GHz  
1,4 GHz – 2,7 GHz

Spot frequencies with a duration of 10 s:

80 MHz  
160 MHz  
380 MHz  
450 MHz  
900 MHz  
1850 MHz  
2150 MHz

The uncertainty of the test: 10 % in the range 80 - 300 MHz, 15 % in the range 300 MHz – 2,7 GHz

Test result: passed

### 3.2.4. Electrical fast transient/burst immunity tests according to MSZ EN 61000-4-4: 2005 (withdrawn standard)

Independent circuits tested with CDN:

aux. power supply input,  
binary inputs,  
CT inputs,  
VT inputs

Test voltage: 2 kV 5 kHz in common mode

Independent circuit tested with capacitive coupling clamp:

Ethernet cable

Test voltage: 2 kV, 5 kHz in common mode

The uncertainty of the test: 0,082 kV

Test result: passed

### **3.2.5. Surge immunity tests according to MSZ EN 61000-4-5:2007**

Independent circuits tested:

aux. power supply input,  
binary inputs,  
CT inputs,  
VT inputs,  
Ethernet cable

Test voltage: 2 kV line-to-earth, 1 kV line-to-line

The uncertainty of the test: 0,082 kV

Test result: passed

### **3.2.6. Testing with conducted disturbances induced by radio frequency fields according to MSZ EN 61000-4-6:2009**

Independent circuits tested:

aux. power supply input,  
binary inputs,  
CT inputs,  
VT inputs,  
Ethernet cable

Frequency range: 150 kHz – 80 MHz

Spot frequencies: 27 MHz, 68 MHz

Test voltage: 10 V

The uncertainty of the test: 7 mV

Test result: passed

**3.2.7. Power frequency magnetic field immunity test according to  
MSZ EN 61000-4-8:2010**

Test field intensity:

30 A/m continuous

300 A/m for 3 s

The uncertainty of the test: 0,61 A

Test result: passed

*The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k = 2$ , which for a normal distribution provides a level of confidence of approximately 95%.*

**4. Overall assessment of the tests**

The EUT complies with the requirements.



Mr. Tamás Veréb  
head of department