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The laboratory is accredited  
by Polish Centre For  
Accreditation  
and offers services in the  
following testing fields:

- electric
- mechanical
- burning behaviour
- environmental
- functionality
- electromagnetic  
compatibility (EMC)

of the following equipment:

- resolution equipment
- transformer station
- electric engines
- cables and wires
- other electric, electronic  
and telecommunication  
devices, sub-assemblies  
and materials

and calibration of:

- DC, AC voltmeters
- DC, AC ammeters
- multimeters
- digital insulation  
resistance meters



## TESTING AND CALIBRATION LABORATORY

**TEST REPORT No. 1299/2008**

(52 0311 8)

**Electromagnetic compatibility**  
*Faults recorder ARCHI LGU/HS*

Report for:

**Computers & Control Sp.J.**

ul. Porcelanowa 11  
**40-246 Katowice**  
**POLAND**

Order No.:

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Date:

**November 28, 2008**

Prepared by:

*Heliosz*

**MSc. Leszek Heliosz**

Reviewed by:

*Pietrzak*

**MSc. Roman Pietrzak**

Authorized by:

LABORATORIUM BADAWEZ I WZORCUJACE  
Kierownik Techniczny

mgr inż. Andrzej Opuszyński

Director

Centrum Elektryfikacji i Automatyzacji  
Górnictwa EMAG  
z-ca DYREKTORA ds. badań i rozwoju  
dr inż. Włodysław Mironowicz

**Katowice, December 16, 2008**

This test report consists of **12** pages

Copy No.: **1**

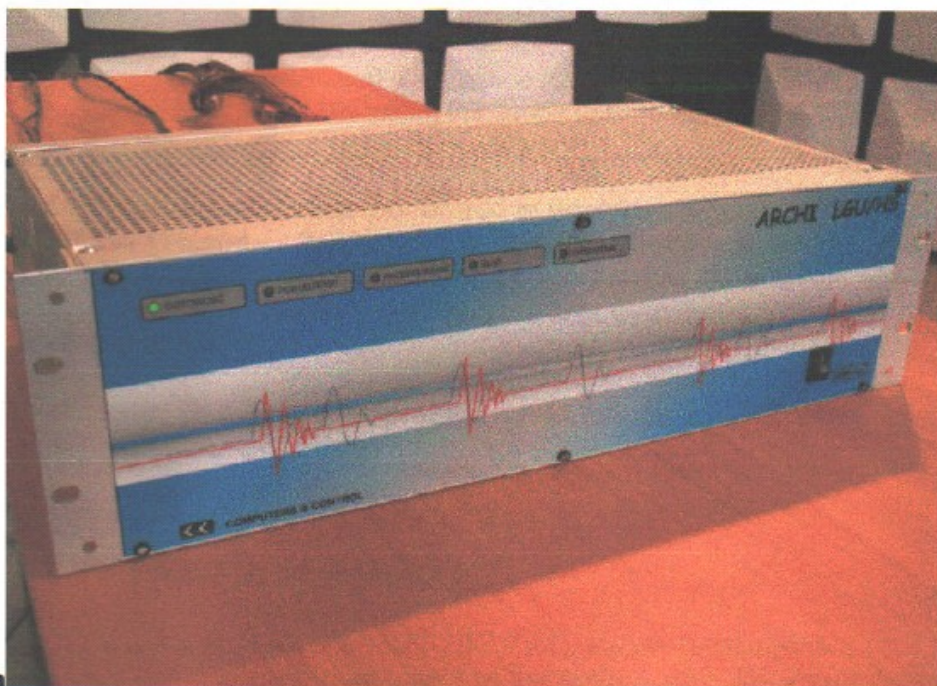




**1. Equipment Under Test (EUT)**

Table 1.

| Item No. | Name and type                | Serial number | Manufacturer / contractor              | Laboratory code |
|----------|------------------------------|---------------|--|-----------------|
| 1.       | Faults recorder ARCHI LGU/HS | 931           | Computers & Control Sp. J.<br>Katowice | 1299/2008       |



a

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**MODUŁ REJESTRUJĄCY ARCHI LGU/HS**  
DATA PRODUKCJI : 2008.12.05 Nr ser. : **931**  
An1 U1 = 220V / freq An5 I1 = 1A WD = 220V  
An2 U2 = 220V / freq An6 I2 = 1A  
An3 U3 = 220V An7 I3 = 1A  
An4 U4 = 220V An8 I4 = 1A

b

Picture 1. Equipment Under Test: a) general view, b) nominal plate



## 2. Testing plan

Table 2.

| Item No. | Type of test  |
|----------|---|
| 1.       | Radiated, radio-frequency, electromagnetic field immunity test according to EN 61000-4-3:2006 within the scope defined in point 6.2 of the testing plan.        |
| 2.       | Immunity to conducted disturbances induced by radio frequency fields according to EN 60255-22-6:2001 within the scope defined in point 6.1 of the testing plan. |

Testing and evaluation was performed in accordance with the testing plan of faults recorder ARCHI LGU/HS of December 2, 2008 prepared by the Employer, hereafter referred to as "testing plan".

- For evaluation of immunity to perturbations, test levels specified in the testing plan have been used. Operation of the EUT was evaluated on the basis of evaluation criteria stated in the testing plan.

During the tests were present representatives of the Employer: MA Ewa Strzelczyk and MSc. Dariusz Urbańczyk

## 3. Description of testing

EUT was supplied by voltage of 230 V AC. Auxiliary equipment was connected to EUT according to the test setup shown in picture 1 of the testing plan. On inputs from An1 to An4 (EUT's P1 port), with the use of autotransformer 1, the voltage  $U = 214$  V AC was forced. On inputs from An5 to An8 (EUT's P2 port), with the use of autotransformer 2, and current transducer, the current  $I = 1$  A AC was forced. To EUT's controlling input and output ports the Manufacturer's test setup with relays was connected. EUT's setup and visualisation parameters were compliant with that given in picture 2 and picture 3 of the testing plan.

Evaluation of EUT's immunity to perturbations was performed on the basis of EUT's front panel signalling diodes, EUT's status register and EUT's events/disturbances log read after the test by a PC computer with SAZ 2000 software installed, connected to EUT by RS 232 interface.



### 3.1. Radiated, radio-frequency, electromagnetic field immunity test

The test was carried out in accordance with point 6.2 of the testing plan.

EUT was placed on a test setup in the way shown in picture 2.

Before the test the functionality check of EUT was carried out – EUT worked in accordance with the description in the testing plan – voltage or current forcing beyond the range limited by the threshold values resulted in signal recording event.

| Test date  | Climatic conditions     |             | Tested by      |
|------------|-------------------------|-------------|----------------|
| 02.12.2008 | Temperature at location | (19 + 21)°C | Leszek Heliosz |
|            | Relative air humidity   | (29 + 35)%  |                |

**Table 3. Connection length**

| Port of EUT            | Section                            | Kind of wire                 | Length [m] |
|------------------------|------------------------------------|------------------------------|------------|
| Power supply 230 V AC  | EUT – laboratory test setup socket | 3 x 0,75 mm <sup>2</sup>     | 1,5 m      |
| Current measure inputs | EUT – Manufacturer's test setup    | 2 x 2,5 mm <sup>2</sup>      | 3 m        |
| Voltage measure inputs | EUT – Manufacturer's test setup    | 2 x 1,5 mm <sup>2</sup>      | 3 m        |
| Binary inputs/outputs  | EUT – Manufacturer's test setup    | 2 x 16 x 1,5 mm <sup>2</sup> | 3 m        |

**Table 4. Test parameters**

|  |   |
|--|---|
| Frequency range swept incrementally with 1% step                     | from 895 MHz to 905 MHz                                     |
| Modulation, depth of modulation, duty cycle, frequency of modulation | PM, 100%, 1:2, 200 Hz                                       |
| Antenna polarization   | horizontal and vertical                                     |
| Test level (field strength of non-modulated signal)                  | 10 V/m  |
| Dwell time of disturbing signal for each frequency                   | 5 s   |
| Number of EUT surfaces subjected to radiation                        | 4 (front and back surfaces and also 2 side surfaces of EUT) |
| Size of uniformity field plane                                       | 1.5 m x 1.5 m   |



### 3.1.1. Equipment

Table 5. Measuring and testing equipment

| Name  | Manufacturer    | Type / model                | Serial number  |
|---|-----------------|-----------------------------|----------------|
| Modified semi-anechoic chamber                          | Albatross       | Albatross Project no P22346 |                |
| Signal generator  | Rohde&Schwarz   | SML 03                      | 102099         |
| Power amplifier   | BONN Elektronik | BLWA 0810-160/100D          | 045880         |
| Power meter   | Rohde&Schwarz   | NRVD                        | 101185         |
| Power probe   | Rohde&Schwarz   | URV5-Z2                     | 100553         |
| Power probe   | Rohde&Schwarz   | URV5-Z2                     | 100554         |
| Transmitting antenna                                    | Rohde&Schwarz   | HL 046                      | 100026         |
| PC computer with Rohde&Schwarz EMC32 software installed |                 |                             |                |
| Hytherograph  | LAB-EL          | LB-701                      | 2572           |
| Measuring tape  | -               | 5 m                         | code ZL/0478/A |
| Multimeter  | M-3860M         | Metex                       | EF 662913      |

Table 6. Equipment made available by the Employer

| Name   | Manufacturer                             | Type / model                     | Serial number |
|--|--|----------------------------------|---------------|
| Autotransformer 1  | "Wielkopolanka"<br>Grodzisk Wielkopolski | TaR - 0.25                       | 404           |
| Autotransformer 2  | "Wielkopolanka"<br>Grodzisk Wielkopolski | TaR - 0.25                       | 78            |
| Current transducer   | Computers & Control Sp.J.,<br>Katowice   | CC/PI/07                         | -             |
| Manufacturer's test setup                                  | Computers & Control Sp.J.,<br>Katowice   | Custom made                      | -             |
| PC Computer (notebook) with<br>SAZ 2000 software installed | Toshiba                                  | S1800-654S<br>/ TS 183E-00V11-PL | 12727224G     |

### 3.1.2. Test results

While testing and also after it was finished, the signalling diodes in EUT's front panel (except the „READY” diode) were not shining. After the test had ended, the status register and the events/disturbances log did not contain any entry.

After the end of the test, EUT worked in accordance with the description contained in the testing plan – voltage or current forcing (on measure inputs) beyond the range limited by the threshold values resulted in recording events.

**EUT met the evaluation criterion, defined in point 5 of the testing plan.**



### 3.2. Immunity to conducted disturbances, induced by radio-frequency fields

Testing was carried out in accordance with point 6.1 of the testing plan.

EUT was placed on a test setup in way shown in picture 3 and picture 4.

Before the test, the functionality check of EUT was carried out – EUT worked in accordance with the description in the testing plan – voltage or current forcing beyond the range limited by the threshold values resulted in signal recording events.

| Test date  | Climatic conditions     |           | Tested by      |
|--|-------------------------|-----------|----------------|
| 03-12-2008<br>(power supply port 230 V AC)   | Temperature at location | (20±22)°C | Leszek Heliosz |
|  | Relative air humidity   | (28±34)%  |                |
| 09-12-2008<br>(binary inputs/outputs, voltage and current measure inputs, communication ports) | Temperature at location | (19±21)°C |                |
|  | Relative air humidity   | (29±35)%  |                |

Table 7. Connection length

| Port of EUT            | Section                         | Kind of wire                 | Length [m] |
|------------------------|---------------------------------|------------------------------|------------|
| Power supply 230 V AC  | EUT – CDN M2                    | 2 x 0,75 mm <sup>2</sup>     | 0,3 m      |
| Enclosure's earthing   | EUT – CDN M1                    | 1 x 0,75 mm <sup>2</sup>     | 0,3 m      |
| Current measure inputs | EUT – Manufacturer's test setup | 2 x 2,5 mm <sup>2</sup>      | 3 m        |
| Voltage measure inputs | EUT – Manufacturer's test setup | 2 x 1,5 mm <sup>2</sup>      | 3 m        |
| Binary inputs/outputs  | EUT – Manufacturer's test setup | 2 x 16 x 1,5 mm <sup>2</sup> | 3 m        |
| Ethernet               | EUT – Manufacturer's test setup | CAT 5 UTP                    | 3 m        |

Table 8. Test parameters in frequency sweep

|  |                 |
|--|-----------------|
| Frequency range swept incrementally with 1% step         | (0,15 ÷ 80) MHz |
| Modulation, depth of modulation, frequency of modulation | AM, 80%, 1 kHz  |
| Test level (field strength of non-modulated signal)      | 10 V            |
| Dwell time of disturbing signal for each frequency       | 1 s             |

Table 9. Test parameters in probe frequencies

|  |                 |
|--|-----------------|
| Probe frequencies  | 27 MHz i 68 MHz |
| Modulation, depth of modulation, frequency of modulation | AM, 80%, 1 kHz  |
| Test level (field strength of non-modulated signal)      | 10 V            |
| Dwell time of disturbing signal for each frequency       | 10 s            |





**Picture 3. Test setup within the EUT's power supply port 230 V AC testing.**



**Picture 4. Test setup within the EUT's binary input/output, current and voltage measuring inputs, and communication ports testing (simultaneously via current injection probe).**



**3.2.1. Equipment****Table 10. Measuring and testing equipment**

| Name  | Manufacturer                 | Type / model                | Serial number  |
|---|------------------------------|-----------------------------|----------------|
| Shielded chamber  | Albatross                    | Projekt Albatross nr P22346 |                |
| Signal generator  | Rohde&Schwarz                | SML 01                      | 103606         |
| Power amplifier   | BONN Elektronik              | BSA 0125-150                | 055970         |
| Coupling/decoupling device                              | Erika Fiedler                | CDN M1                      | 06K004         |
| Coupling/decoupling device                              | Erika Fiedler                | CDN M2                      | 06K005         |
| Coupling/decoupling device                              | Erika Fiedler                | CDN M3                      | 06K006         |
| Bulk current injection probe                            | Fischer Custom Communication | F-120-9A                    | 434            |
| Monitor current probe                                   | Fischer Custom Communication | F-52                        | 263            |
| 6dB attenuator  | Bird Electronic Corporation  | 150-5A-FFN-06               | -              |
| PC computer with Rohde&Schwarz EMC32 software installed |                              |                             |                |
| Hytherograph  | LAB-EL                       | LB-701                      | 2572           |
| Measuring tape  | -                            | 5 m                         | ozn. ZL/0478/A |
| Multimeter  | Metex                        | M-3860M                     | EF 662913      |

**Table 11. Equipment made available by the Employer**

| Name   | Manufacturer                             | Type / model                         | Serial number |
|--|--|--------------------------------------|---------------|
| Autotransformer 1  | "Wielkopolanka"<br>Grodzisk Wielkopolski | TaR - 0.25                           | 404           |
| Autotransformer 2  | "Wielkopolanka"<br>Grodzisk Wielkopolski | TaR - 0.25                           | 78            |
| Current transducer   | Computers & Control Sp.J.,<br>Katowice   | CC/PI/07                             | -             |
| Manufacturer's test setup                                  | Computers & Control Sp.J.,<br>Katowice   | Custom made                          | -             |
| PC Computer (notebook) with SAZ<br>2000 software installed | Toshiba                                  | S1800-654S<br>/ TS 183E-<br>00V11-PL | 12727224G     |



**3.2.2. Test results**

- In test with frequency sweep in range from 150 kHz to 80 MHz:  
While testing and also after it was finished, the signalling diodes in EUT's front panel (except the „READY“ diode) were not shining. After the test had ended, the status register and the events/disturbances log did not contain any entry.
  
- In test at probe frequencies 27 MHz and 68 MHz:  
Forcing of input supply level below the threshold level made EUT change into the recording state, which was marked by lighting up the diodes in EUT's front panel, the order of which was: „RECORDING“, „OVERWRITE“, „ERROR“. The return of the input supply value to the value of before forcing, resulted in lighting off the „ERROR“ diode. After the test, status register contained information about the recording event, in the event log there were entries referring to the beginning and finishing of the recording, and in the disturbance log there were the measuring data of the event.

After the end of the test, EUT worked in accordance with the description contained in the testing plan – voltage or current forcing (on measure inputs) beyond the range limited by the threshold values resulted in recording of measured signals.

**EUT met the evaluation criterion, defined in point 5 of the testing plan.**



#### 4. Summary

Table 12. List of test results

| Item No. | Type of test  | Test result  |
|----------|---|--|
| 1.       | Radiated, radio-frequency, electromagnetic field immunity test according to EN 61000-4-3:2006 within the scope defined in point 6.2 of the testing plan.        | EUT met the evaluation criterion, defined in point 5 of the testing plan |
| 2.       | Immunity to conducted disturbances induced by radio frequency fields according to EN 60255-22-6:2001 within the scope defined in point 6.1 of the testing plan. | EUT met the evaluation criterion, defined in point 5 of the testing plan |

Comments:

- The Laboratory guarantees compatibility of the parameters of disturbing signals with the requirements included in the basic standards cited.

#### 5. Annexes

1. Testing plan of faults recorder ARCHI LGU/H of December 2, 2008, formulated by the Employer.

#### 6. Distribution list of the test report

| Copy No. | Copy for                                       |
|----------|--|
| 1.       | Computers & Control Sp. J.                     |
| 2.       | Computers & Control Sp. J.                     |
| 3.       | Testing and Calibration Laboratory, CEiAG EMAG |

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[ E N D   O F   R E P O R T ]



Annex 1 to „Test report  
of faults recorder  
ARCHILGU/HS

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### **Testing plan of faults recorder ARCHILGU/HS**

Prepared by: MA Ewa Strzelczyk

*strzelczyk Ewa*

Katowice, December 2, 2008



## 1. Equipment under test (EUT)

Equipment under test is faults recorder ARCHI LGU/HS in 3U enclosure.

## 2. Description of equipment under test

Faults recorder ARCHI performs recording of power lines state before, within and after its emergency state. It enables selftriggering caused by crossing the threshold limit of voltage/current inputs and binary inputs.

ARCHI is a device made in microprocessor technology and is equipped with:

- recorder's power supply input – from 80 to 230 [V] DC/AC
- four current measure inputs  $I_N = 1$  A
- four voltage measure inputs  $U_N = 220$  V
- 15 binary inputs
- local pulpit, including 4 signalling LED diodes.
- communication port, working in one of electric standards: RS 232, RS 485, CL – current loop
- LAN

Detailed information are available on manufacturer's page: [www.candc.pl](http://www.candc.pl)

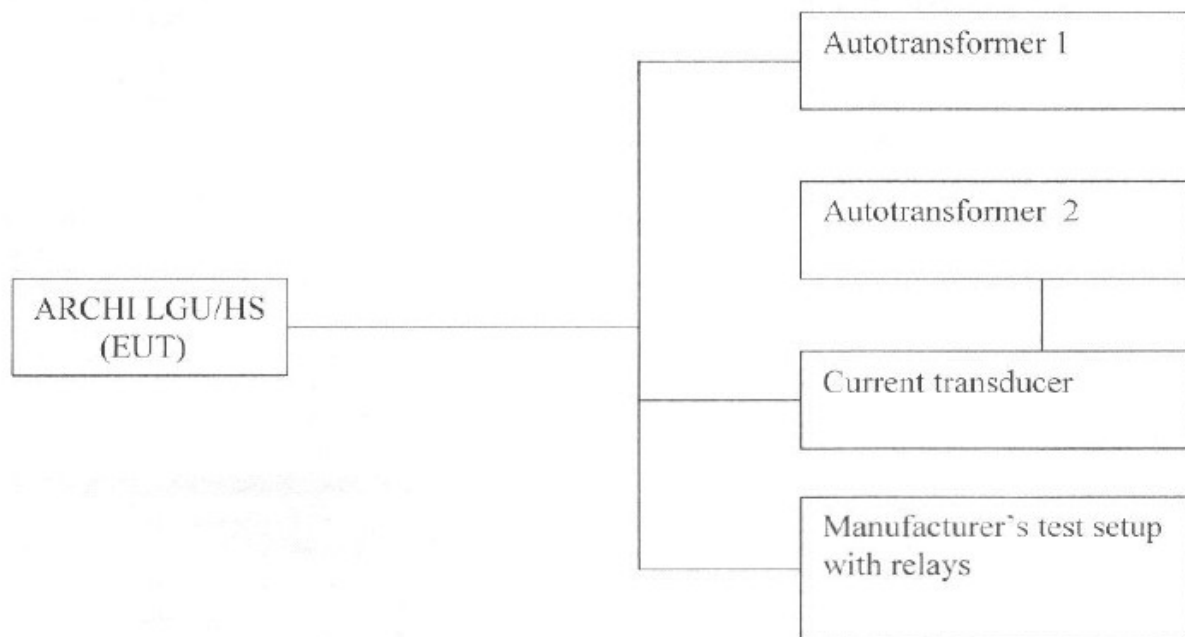
## 3. Configuration during the tests

During the tests, the auxiliary equipment should be connected to recorder in the test setup shown in picture 1. Autotransformers and current transducer act as voltage and current forcers. Output of autotransformer 1 should be connected in parallel to recorder's voltage inputs, from An1 to An4 (recorder's P1 port). Current transducer's output should be connected in series to recorder's current inputs, from An5 to An8 (recorder's P2 port). Voltage and current values are controlled by recorder, and after crossing the threshold limits, the signals recording event should take place.

Recorder's set up and recorder's visualisation parameters are showed correspondingly in picture 2 and picture 3. The recorder should be supplied by voltage of 230 V AC. Forcing values, setting by autotransformers 1 and 2, should be correspondingly:  $U = 214$  V AC,

$I = 1$  A AC. To setting up recorder's parameters, a PC computer with SAZ 2000 program installed should be used, connected to recorder using RS232 interface.





**Picture 1. Scheme of recorder's test setup**



| Nastawy               |                   |    |               |    |        |            |            |              |         |    |            |            |
|-----------------------|-------------------|----|---------------|----|--------|------------|------------|--------------|---------|----|------------|------------|
| Poziony wyzwalania    | Wejście / wyjście |    | Tryb pracy    |    |        |            |            |              |         |    |            |            |
| Sygnal                | Próg dolny...     | P. | Próg górny... | P. | Opó... | T awaryjny | T powar... | T kontynu... | dK / dt | P. | T awaryjny | T powar... |
| Prąd I1               | 806 A             | H  | 1294 A        | H  |        | 514 ms     | 514 ms     | 514 ms       |         |    |            |            |
|                       | 708 A             | L  | 1196 A        | L  |        |            |            |              |         |    |            |            |
| Prąd I2               | 806 A             | H  | 1294 A        | H  |        | 514 ms     | 514 ms     | 514 ms       |         |    |            |            |
|                       | 708 A             | L  | 1196 A        | L  |        |            |            |              |         |    |            |            |
| Prąd I3               | 806 A             | H  | 1294 A        | H  |        | 514 ms     | 514 ms     | 514 ms       |         |    |            |            |
|                       | 708 A             | L  | 1196 A        | L  |        |            |            |              |         |    |            |            |
| Prąd I4               | 806 A             | H  | 1294 A        | H  |        | 514 ms     | 514 ms     | 514 ms       |         |    |            |            |
|                       | 708 A             | L  | 1196 A        | L  |        |            |            |              |         |    |            |            |
| Napięcie U1           | 203.99 kV         | H  | 224.84 kV     | H  |        | 514 ms     | 514 ms     | 514 ms       |         |    |            |            |
|                       | 202.05 kV         | L  | 224.41 kV     | L  |        |            |            |              |         |    |            |            |
| Napięcie U2           | 203.99 kV         | H  | 224.84 kV     | H  |        | 514 ms     | 514 ms     | 514 ms       |         |    |            |            |
|                       | 202.05 kV         | L  | 224.41 kV     | L  |        |            |            |              |         |    |            |            |
| Napięcie U3           | 203.99 kV         | H  | 224.84 kV     | H  |        | 514 ms     | 514 ms     | 514 ms       |         |    |            |            |
|                       | 202.05 kV         | L  | 224.41 kV     | L  |        |            |            |              |         |    |            |            |
| Napięcie U4           | 203.99 kV         | H  | 224.84 kV     | H  |        | 514 ms     | 514 ms     | 514 ms       |         |    |            |            |
|                       | 202.05 kV         | L  | 224.19 kV     | L  |        |            |            |              |         |    |            |            |
| Częstotliwość 1       | 48.00 Hz          | H  | 52.20 Hz      | H  |        | 514 ms     | 514 ms     | 514 ms       |         |    |            |            |
|                       | 47.80 Hz          | L  | 52.00 Hz      | L  |        |            |            |              |         |    |            |            |
| Częstotliwość 2       | 48.00 Hz          | H  | 52.20 Hz      | H  |        | 514 ms     | 514 ms     | 514 ms       |         |    |            |            |
|                       | 47.80 Hz          | L  | 52.00 Hz      | L  |        |            |            |              |         |    |            |            |
| Składowa zgodna prądu |                   |    |               |    |        |            |            |              |         |    |            |            |

| Nastawy                     |                   |    |               |    |        |            |            |              |         |        |            |            |
|-----------------------------|-------------------|----|---------------|----|--------|------------|------------|--------------|---------|--------|------------|------------|
| Poziony wyzwalania          | Wejście / wyjście |    | Tryb pracy    |    |        |            |            |              |         |        |            |            |
| Sygnal                      | Próg dolny...     | P. | Próg górny... | P. | Opó... | T awaryjny | T powar... | T kontynu... | dK / dt | P.     | T awaryjny | T powar... |
| Składowa zgodna napięcia    |                   |    |               |    |        |            |            |              |         |        |            |            |
| Składowa przeciwna napięcia |                   |    |               |    |        |            |            |              |         |        |            |            |
| Składowa zerowa napięcia    |                   |    |               |    |        |            |            |              |         |        |            |            |
| Moc czynna                  | 1158.0 MW         | H  | 0 s           |    | 514 ms | 514 ms     | 514 ms     | 1098.9 MW    | H       | 514 ms | 514 ms     | 514 ms     |
|                             | 1095.5 MW         | L  |               |    |        |            |            | 100 ms       | L       |        |            |            |
| Moc bierna                  | 2364.4 M          | H  | 0 s           |    | 514 ms | 514 ms     | 514 ms     |              |         |        |            |            |
|                             | 1934.5 M          | L  |               |    |        |            |            |              |         |        |            |            |
| Dwustanowy 1                |                   |    | H             |    | 514 ms | 514 ms     | 514 ms     |              |         |        |            |            |
| Dwustanowy 2                |                   |    | H             |    | 514 ms | 514 ms     | 514 ms     |              |         |        |            |            |
| Dwustanowy 3                |                   |    |               |    |        |            |            |              |         |        |            |            |
| Dwustanowy 4                |                   |    |               |    |        |            |            |              |         |        |            |            |
| Dwustanowy 5                |                   |    | H             |    | 514 ms | 514 ms     | 514 ms     |              |         |        |            |            |
| Dwustanowy 6                |                   |    | H             |    | 514 ms | 514 ms     | 514 ms     |              |         |        |            |            |
| Dwustanowy 7                |                   |    | H             |    | 514 ms | 514 ms     | 514 ms     |              |         |        |            |            |
| Dwustanowy 8                |                   |    | H             |    | 514 ms | 514 ms     | 514 ms     |              |         |        |            |            |
| Dwustanowy 9                |                   |    | H             |    | 514 ms | 514 ms     | 514 ms     |              |         |        |            |            |
| Dwustanowy 10               |                   |    | H             |    | 514 ms | 514 ms     | 514 ms     |              |         |        |            |            |
| Dwustanowy 11               |                   |    | H             |    | 514 ms | 514 ms     | 514 ms     |              |         |        |            |            |
| Dwustanowy 12               |                   |    | H             |    | 514 ms | 514 ms     | 514 ms     |              |         |        |            |            |
| Dwustanowy 13               |                   |    | H             |    | 514 ms | 514 ms     | 514 ms     |              |         |        |            |            |
| Dwustanowy 14               |                   |    | H             |    | 514 ms | 514 ms     | 514 ms     |              |         |        |            |            |
| Globalne pobudzenie         |                   |    | H             |    | 514 ms | 514 ms     | 514 ms     |              |         |        |            |            |

Picture 2. The recorder's set up

Parametry

☒ Sygnały rejestrowane
 ☐ Sygnały wyliczane

| Typ  | Zacisk     | Prz. | Nominal    | J... | Nazwa               | Ek... | Dr... |
|------|------------|------|------------|------|---------------------|-------|-------|
| I AC | P2-1, P2-2 | 1000 | In = 1 A   | A    | Prąd I1             | Std.  | Std.  |
| I AC | P2-3, P2-4 | 1000 | In = 1 A   | A    | Prąd I2             | Std.  | Std.  |
| I AC | P2-5, P2-6 | 1000 | In = 1 A   | A    | Prąd I3             | Std.  | Std.  |
| I AC | P2-7, P2-8 | 1000 | In = 1 A   | A    | Prąd I4             | Std.  | Std.  |
| U AC | P1-1, P1-2 | 1000 | Un = 220 V | kV   | Napięcie U1         | Std.  | Std.  |
| U AC | P1-3, P1-4 | 1000 | Un = 220 V | kV   | Napięcie U2         | Std.  | Std.  |
| U AC | P1-5, P1-6 | 1000 | Un = 220 V | kV   | Napięcie U3         | Std.  | Std.  |
| U AC | P1-7, P1-8 | 1000 | Un = 220 V | kV   | Napięcie U4         | Std.  | Std.  |
| f    | P1-1, P1-2 |      |            |      | Częstotliwość 1     | Std.  | Std.  |
| f    | P1-3, P1-4 |      |            |      | Częstotliwość 2     | Std.  | Std.  |
|      |            |      |            |      |                     |       |       |
| D    | IN1-1      |      |            |      | Dwustanowy 1        | Std.  | Std.  |
| D    | IN1-2      |      |            |      | Dwustanowy 2        | Std.  | Std.  |
| D    | IN1-3      |      |            |      | Dwustanowy 3        | Std.  | Std.  |
| D    | IN1-4      |      |            |      | Dwustanowy 4        | Std.  | Std.  |
| D    | IN1-5      |      |            |      | Dwustanowy 5        | Std.  | Std.  |
| D    | IN1-6      |      |            |      | Dwustanowy 6        | Std.  | Std.  |
| D    | IN1-7      |      |            |      | Dwustanowy 7        | Std.  | Std.  |
| D    | IN1-8      |      |            |      | Dwustanowy 8        | Std.  | Std.  |
| D    | IN1-9      |      |            |      | Dwustanowy 9        | Std.  | Std.  |
| D    | IN1-10     |      |            |      | Dwustanowy 10       | Std.  | Std.  |
| D    | IN1-11     |      |            |      | Dwustanowy 11       | Std.  | Std.  |
| D    | IN1-12     |      |            |      | Dwustanowy 12       | Std.  | Std.  |
| D    | IN1-13     |      |            |      | Dwustanowy 13       | Std.  | Std.  |
| D    | IN1-14     |      |            |      | Dwustanowy 14       | Std.  | Std.  |
| D    | IN1-15     |      |            |      | Globalne pobudzenie | Std.  | Std.  |
|      |            |      |            |      |                     |       |       |
| D    | IN2-1      |      |            |      | Dwustanowy 16       | Std.  | Std.  |
| D    | IN2-2      |      |            |      | Dwustanowy 17       | Std.  | Std.  |
| D    | IN2-3      |      |            |      | Dwustanowy 18       | Std.  | Std.  |
| D    | IN2-4      |      |            |      | Dwustanowy 19       | Std.  | Std.  |
| D    | IN2-5      |      |            |      | Dwustanowy 20       | Std.  | Std.  |
| D    | IN2-6      |      |            |      | Dwustanowy 21       | Std.  | Std.  |
| D    | IN2-7      |      |            |      | Dwustanowy 22       | Std.  | Std.  |
| D    | IN2-8      |      |            |      | Dwustanowy 23       | Std.  | Std.  |
| D    | IN2-9      |      |            |      | Dwustanowy 24       | Std.  | Std.  |
| D    | IN2-10     |      |            |      | Dwustanowy 25       | Std.  | Std.  |

Wektor pobudzeń

Wyjście

Picture 3. The recorder's visualization parameters

#### 4. Evaluation method

Evaluation of correct recorder's functionality should be performed during the test - on the basis of recorder's front panel signalling diodes state, and after the test - on the basis of recorder's status register and recorder's events/disturbances logs, read after the test is finished, by a PC computer with SAZ 2000 software installed, connected to recorder by RS 232 interface.



## 5. Evaluation criterion

- In test with frequency sweep:

During the test and also after finishing of the test, recorder's front panel signalling diodes should not shine (except the „READY” diode). After finishing of the test, the recorder's status register and the recorder's events/disturbances logs should not contain any entries.

- In test at probe frequencies 27 MHz and 68 MHz:

Forcing of input supply level below the threshold level should change the recorder's state from standby state to stimulation state, marked by shining recorder's front panel LED diodes in order: "RECORDING", „OVERWRITE", „ERROR" (contacts sticking error). The return of the input supply value to the level before the forcing, should result in lighting off the "ERROR" diode. After the end of the testing, the recorder's status register should contain information about the recording event, the recorder's event log should contain entries referring to the beginning and finishing of the recording, and the recorder's disturbance log should contain measuring data of the event.

## 6. Testing plan

### 6.1 Immunity to conducted disturbances, induced by radio-frequency fields with amplitude modulation.

Test method: EN 60255-22-6:2001

Scope of the test: frequency sweeping in range from 0,15 MHz to 80 MHz and testing in stimulation mode, at probe frequencies: 27 MHz and 68 MHz

Test configuration: accordingly with point 3.

Tested ports:

- supply power input AC 230 V (coupling via CDN)
- binary input/output, current and voltage measuring inputs, communication ports (simultaneously via current injection probe)

Exposing parameters:

- test level: 10 V (unmodulated value)
- modulation AM, 80%, 1 kHz

Dwell time at each frequency:

- 1 s – at frequency sweeping in range from 0,15MHz to 80 MHz
- 10 s – at probe frequencies testing 27 MHz and 68 MHz

### 6.2. Radiated, radio-frequency, electromagnetic field immunity test (in GSM frequency range)

Test method: EN 61000-4-3:2006

Scope of the test: frequency sweeping in frequency range from 895 MHz to 905 MHz

Test configuration: accordingly with description in point 3. The Auxiliary equipment should be placed on the floor of the chamber.

Exposing parameters:

- test level: 10 V/m (unmodulated value)
- modulation PM, 100%, 200 Hz, duty cycle 2,5 ms
- frequency step: 0,05%
- dwell time at each frequency: 5 s