

Testing laboratory for climatic, mechanical  
and corrosive environmental stress

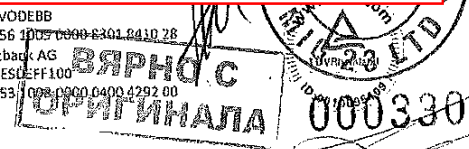
## CERTIFICATE of QUALITY TEST



Test report No. 10220.01 / 13

Client	<b>Siemens AG</b> <b>IC SG EA PRO D 6 2</b> Wernerwerkdammm 5 13629 Berlin	
Equipment under test	<b>Protection Relay</b> specimen 1	<b>Overcurrent Protection 7SJ663</b> <sup>1</sup> / <sub>2</sub> of 19" for panel flush mounting
	<b>Protection Relay</b> specimen 2	<b>Overcurrent Protection 7SJ662</b> <sup>1</sup> / <sub>3</sub> of 19" for panel flush mounting
Purpose	<b>Test of the climatic resistance and of the operability</b> according to the standards and to the demands of the client	
Test program	<b>Cold</b> according to IEC 60068-2-1 and IEC 60255-1 <b>Heating</b> according to IEC 60068-2-2 and IEC 60255-27 <b>Dry heat</b> according to IEC 60068-2-2 and IEC 60255-1 <b>Slow temperature change</b> according to IEC 60068-2-14 and IEC 60255-1 <b>Damp heat; cyclic</b> according to IEC 60068-2-30 and IEC 60255-1 <b>Cold</b> according to IEC 60068-2-1 and IEC 60255-1 <b>Dry heat</b> according to IEC 60068-2-2 and IEC 60255-1 <b>Fast temperature change</b> according to IEC 60068-2-14 and IEC 60255-1	
Test period	12 November 2013 to 7 January 2014	
Realization / results	see page 2 to 5	
Total number of pages	11 pages (including 2 appendices)	
Test result	<b>The tests of the climatic resistance and of the operability were realized according to the test program.</b> <b>Neither damages nor noticeable problems were determined.</b> <b>The further evaluation will be done by the client.</b>	

На основание чл.36а ал.3 от ЗОП



**1 Purpose**

Test of the climatic resistance and of the operability according to the standards and to the demands of the client.

**2 Equipment under test (EUT)**

<b>Protection Relay</b>	<b>Overcurrent Protection 7SJ663</b>
specimen 1	Prototype 020
model	1/2 of 19" for panel flush mounting
MLFB	7SJ6632-5KB90-3RH7-L0R/BB
Firmware	V04.00.03
DIGSI-Software	V4.88

**Module in Device 7SJ663**

1. Display Board with the serial Number 600000 245043
2. Current / Voltage input Board M102/3/6 - 2 with the serial Number 600000 245123
3. Power supply Board PS BO OB – 230 AC with the serial Number CB1311000174
4. BIO Board with the serial Number 600000 208677
5. BIO Board with the serial Number 600000 208676
6. CPU Board with the serial Number 600000 245060
7. ETH Board with the serial Number 600000 238963
8. BIO Board with the serial Number 600000 255772

**Settings in Device 7SJ663**

1. Overcurrent  $\geq 10\%$ ; configured to LED 1
2. Overvoltage  $\geq 10\%$ ; configured to LED 2
3. Undervoltage  $\leq 10\%$ ; configured to LED 3
4. Binary Input (BI): BI 1; BI3 – BI13; BI15 – BI25; BI27 – BI36 high active
5. BI2; BI 14; BI 26 low active
6. Binary Output (BO) BO4; BO6; BO7 are supervised

<b>Protection Relay</b>	<b>Overcurrent Protection 7SJ663</b>
specimen 2	Prototype 009
model	1/3 of 19" for panel flush mounting
MLFB	7SJ6621-5KB90-3HG7-L0D/BB
Firmware	V04.00.03
DIGSI-Software	V4.88

**Module in Device 7SJ662**

1. Display Board with the serial Number 600000 254760
2. Current / Voltage input Board M102/3/6 - 2 with the serial Number 000 245116
3. Power Supply Board PS BO OB – 230 AC with the serial Number CB1311000175
4. EXT. BIO Board with the serial Number 600000 255789
5. BI Board with the serial Number 600000 245100
6. CPU Board with the serial Number 600000 245053
7. ETH Board with the serial Number 600000 049730

**Settings in Device 7SJ662**

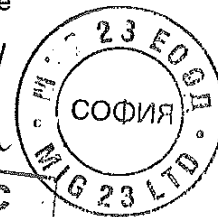
1. Overcurrent  $\geq 10\%$ ; configured to LED 1
2. Overvoltage  $\geq 10\%$ ; configured to LED 2
3. Undervoltage  $\leq 10\%$ ; configured to LED 3
4. Binary Input (BI): BI 1; BI3 – BI8; BI10 – BI17; BI19 – BI21 high active
5. BI2; BI9; BI 18 low active
6. Binary Output (BO): BO4; BO6; BO7 are supervised

delivery date of the EUT 11 November 2013

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**4.4 Slow temperature change – test Nb**

according to IEC 60068 -2-14 and IEC 60255-1

specimens	operating with measurements AC 57 V; 1.0 A and 50 Hz connected test equipment of the client	
lower test temperature	(- 25 ± 3)°C	
upper test temperature	(+70 ± 2)°C	
storage time	each 12:00 h	
changoover time	each 5:00 h	(20 K/h)
test duration	170:00 h	(5 cycles, each 34:00 h)

After the test, the specimens shall be stored at standard conditions (+20 ° C, 30% relative humidity) for at least 2:00 h.

**4.5 Damp heat, cyclic – test Db**

according to IEC 60068-2-30 and IEC 60255-1

specimens	operating with measurements AC 57 V; 1.0 A and 50 Hz connected test equipment of the client	
lower test temperature	(+ 25 ± 3)°C	
relative humidity	(97 ± 3) %	
upper test temperature	(+55 ± 2)°C	
relative humidity	(93 ± 3) %	
storage time	each 9:00 h	
changoover time	each 3:00 h	(0,17 K/min)
test duration	144:00 h	(6 cycles, each 24:00 h)

After the test, the specimens shall be stored at standard conditions (+20 ° C, 30% relative humidity) for at least 2:00 h.

**4.6 Cold – test Ad**

according to IEC 60068 -2-1 and IEC 60255-1

specimens	not operating
test temperature	(- 40 ± 3)°C
test duration	96:00 h
temperature rate	1.00 K/min

After the test, the specimens shall be stored at standard conditions (+20 ° C, 30% relative humidity) for at least 2:00 h.

**4.7 Dry heat – test Bd**

according to IEC 60068 -2-2 and IEC 60255-1

specimens	operating with measurements AC 57 V; 1.0 A and 50 Hz connected test equipment of the client	
test temperature	(+85 ± 2)°C	
test duration	16:00 h	
temperature rate	1.00 K/min	

After the test, the specimens shall be stored at standard conditions (+20 ° C, 30% relative humidity) for at least 2:00 h.

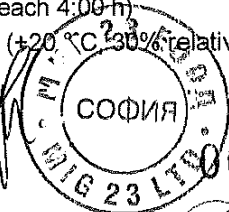
**4.8 Fast temperature change – test Na**

according to IEC 60068 -2-14 and IEC 60255-1

specimens	not operating	
lower test temperature	(- 25 ± 3)°C	
upper test temperature	(+70 ± 2)°C	
storage time	each 2:00 h	
changoover time	each < 10 s	
test duration	240:00 h	(60 cycles, each 4:00 h)

After the test, the specimens shall be stored at standard conditions (+20 ° C, 30% relative humidity) for at least 2:00 h.

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## 5 Realization

The environmental tests were carried out one by one according to the program of testing methods (complex 4.1 to 4.8), according to the standards and to the demands of the client. The tests were realized one by one according to the test sequence.

### **Visual inspection**

Before and after each single test, each specimen was examined visually for cracks, breaks, distortions, mechanical and thermal damages.

### **Functional test**

Before, partly during and after the test, a functional test was realized.

### **Measuring and test equipment**

climatic chamber 4	KPK 400 (SN: 010/90, Feutron)
temperature shock chamber 66	VT7012 (SN: 58566159610010, Vötsch)
power supply DC	EA-PSI 8160-05R (SN: 1231540004, EA)

### **Test equipment provided by the client**

Laptop Siemens Nixdorf; Type Scenic Mobile 700; Inv. No. 6500 0133  
 Omicron; Type CMC 156; Inv. No 6500 0103  
 Siemens Multizet S; Inv. No. G330168  
 Siemens Multizet S; Inv. No. 211051  
 Relay Contact Supervision; Type Siemens 09.2012  
 Programmable Power Supply; Type EA-PS 18160-04R; Inv. No. 0590

## 6 Results

During and after the climatic tests of the **Protection Relay Overcurrent Protection 7SJ663 (Prototype 020)** and **Protection Relay Overcurrent Protection 7SJ662 (Prototype 009)** with

- |  |           |
|--|-----------|
| - Cold (- 20°C, 96 h operating)  | - Test Ad |
| - Dry heat (+55°C, 96 h operating)   | - Test B  |
| - Dry heat (+70°C, 96 h operating)   | - Test Bd |
| - Slow temperature change (- 25°C / +70°C, 5 x 34 h operating)                 | - Test Nb |
| - Damp heat, cyclic (+25°C, 97 % r. h. / +55°C, 97 % r. h. 6 x 24 h operating) | - Test Db |
| - Cold (- 40°C, 96 h not operating)  | - Test Ad |
| - Dry heat (+85°C, 96 h operating)   | - Test Bd |
| - Fast temperature change (- 25°C / +70°C, 60 x 4 h not operating)             | - Test Na |

neither cracks, breaks, distortions nor any other thermal damages were determined.

The operability of both specimens was ensured at any time before, during and after each test.

**The tests of the climatic resistance and of the operability were realized according to the test program.**

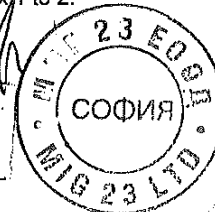
**Neither damages nor noticeable problems were determined.**

**The further evaluation will be done by the client.**

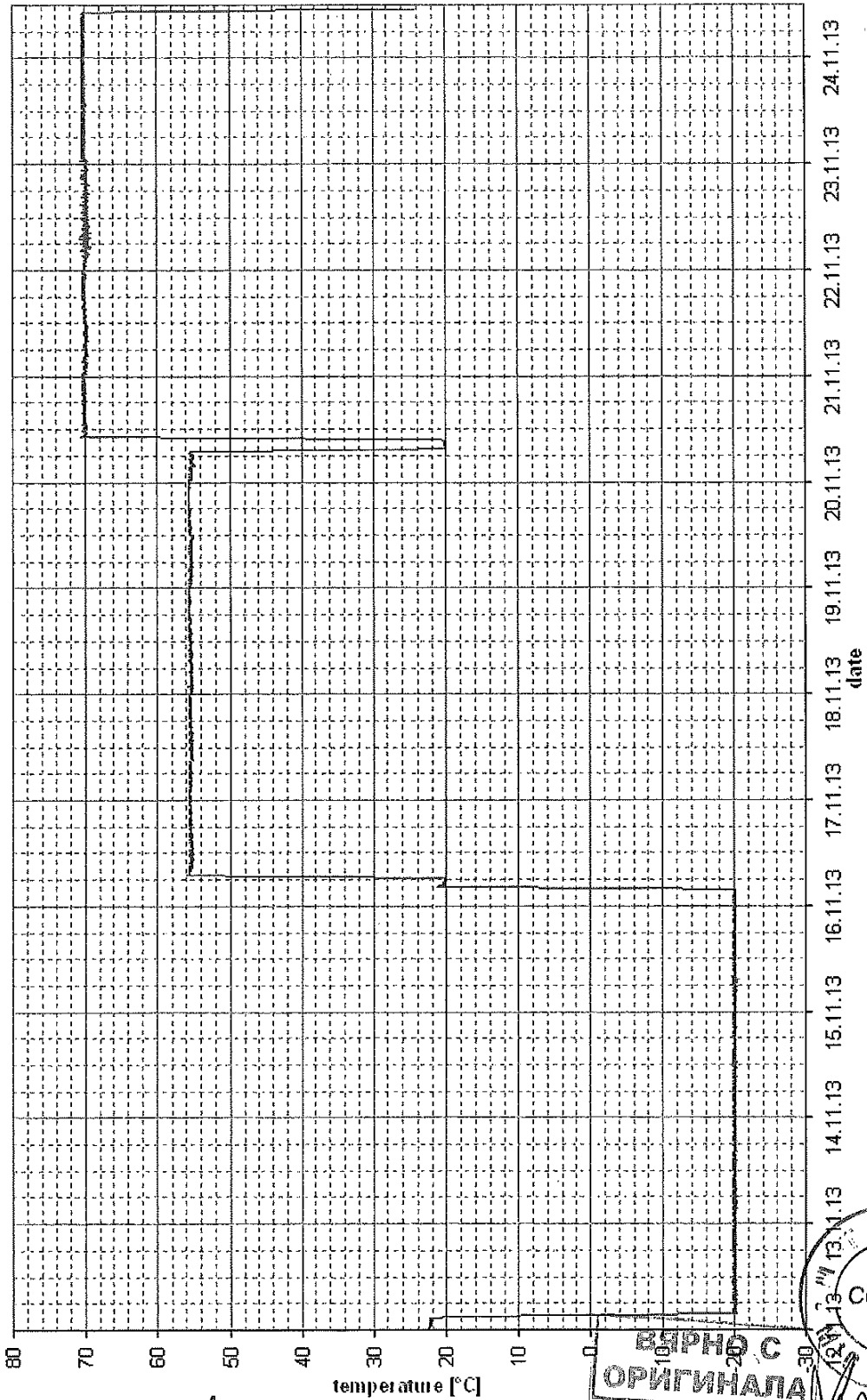
The results of the test only refer to the above mentioned equipment under test. The report or individual pages of this testing report may only be copied following the written consent of the testing laboratory. This testing report-No. 10220.01 / 13 includes 5 pages and appendix 1 to 2.

appendix 1 - climatic protocols  
 appendix 2 - pictures

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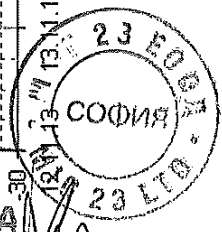


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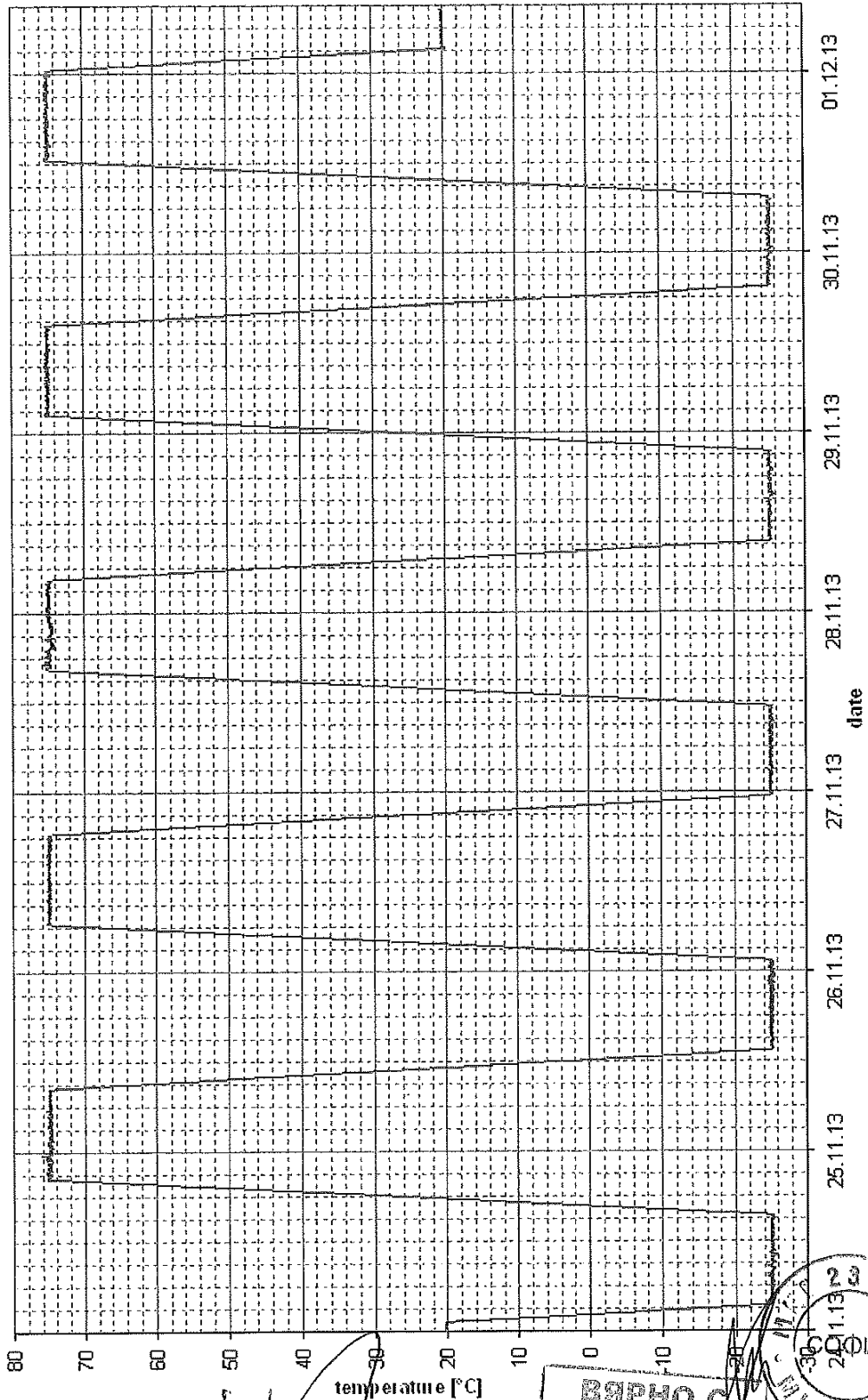


Temperature behavior of climatic test chamber KPK 4 during the tests with dry heat and cold

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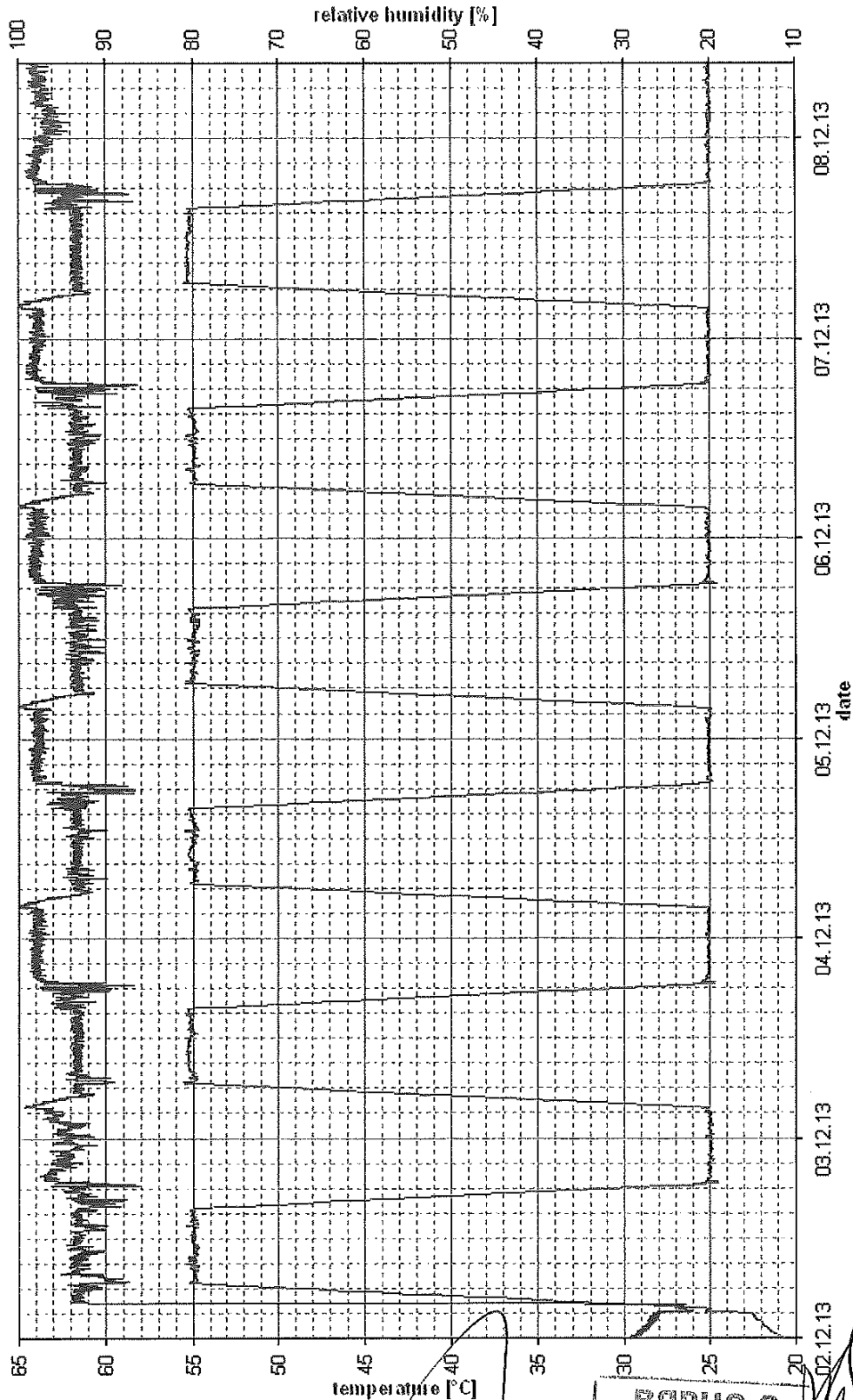


Temperature behavior of climatic test chamber KPK 4 during the test with slow temperature change

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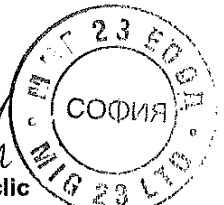
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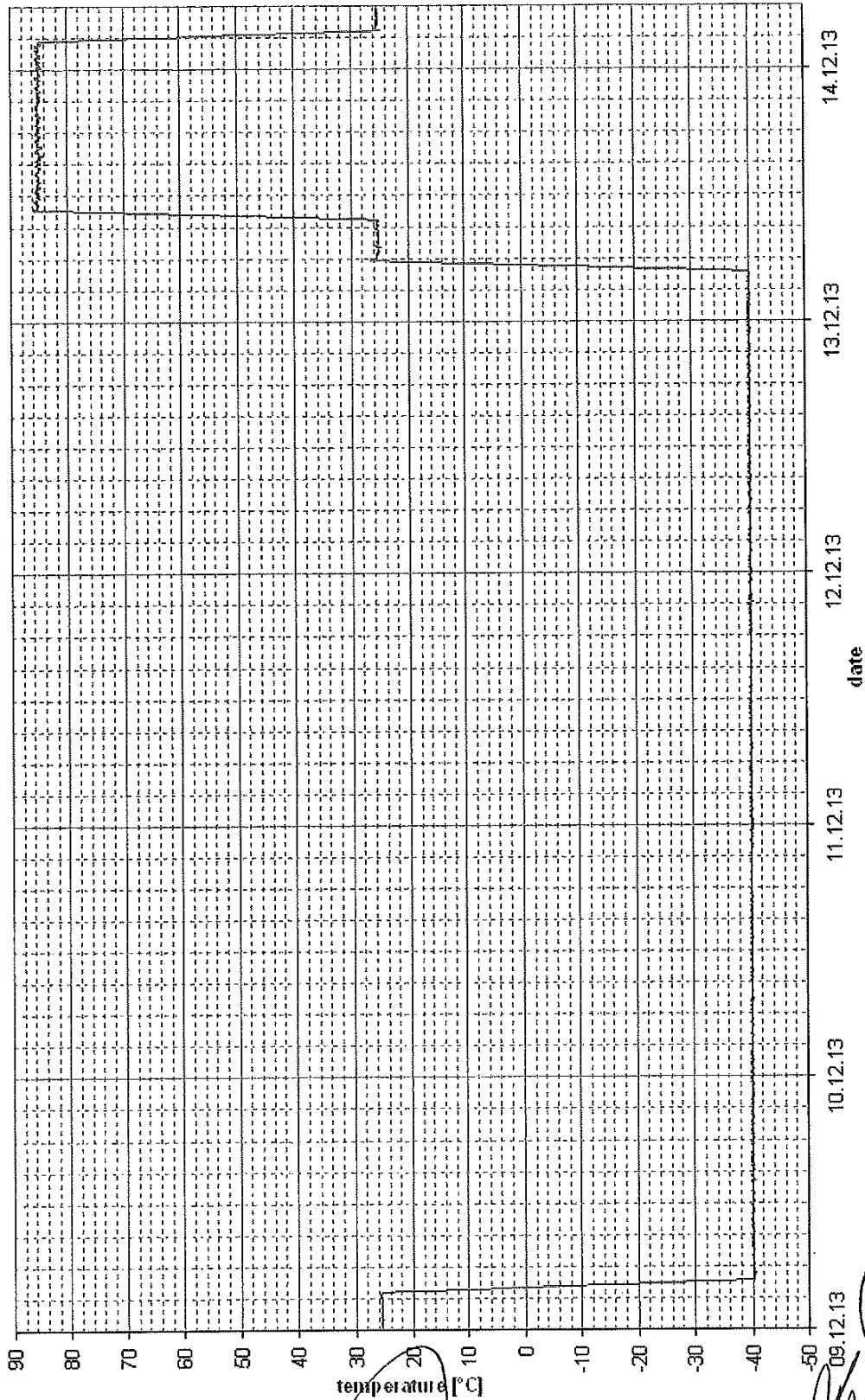
Climatic behavior of climatic test chamber KPK 4 during the tests with damp heat cyclic

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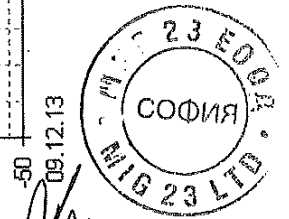


Temperature behavior of climatic test chamber KPK 4 during the tests with dry heat and cold

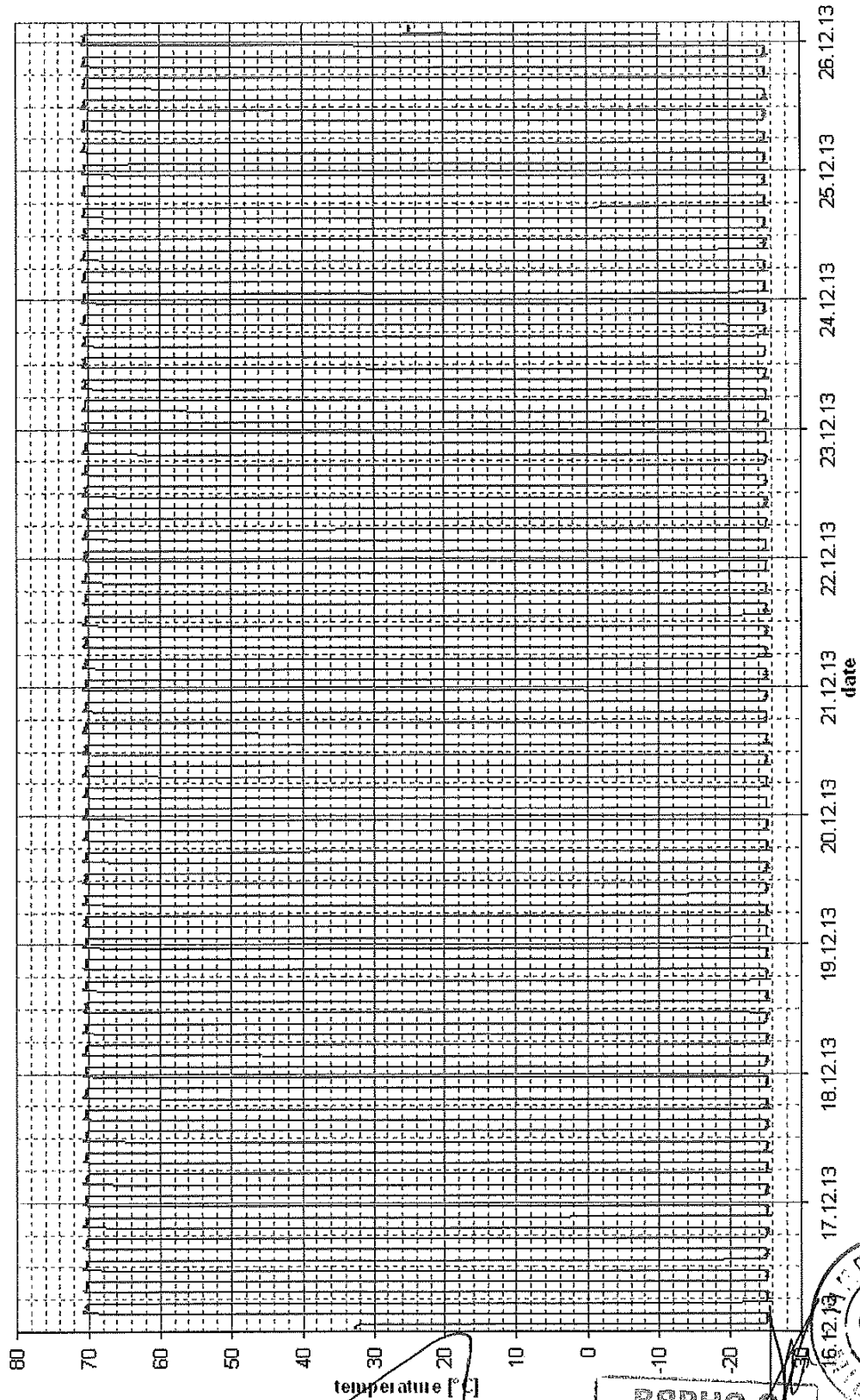
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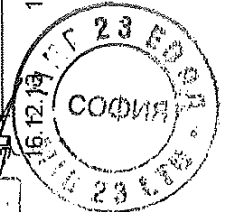


Temperature behavior of temperature shock chamber during the test with fast temperature change

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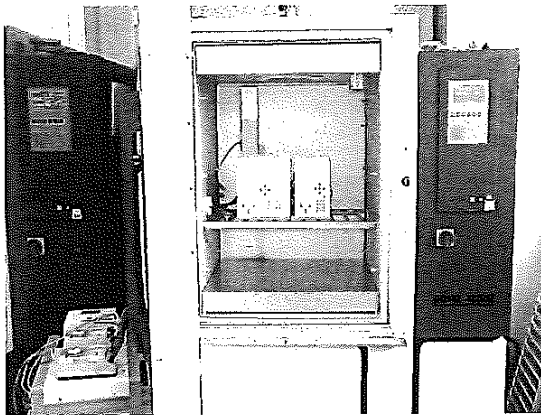
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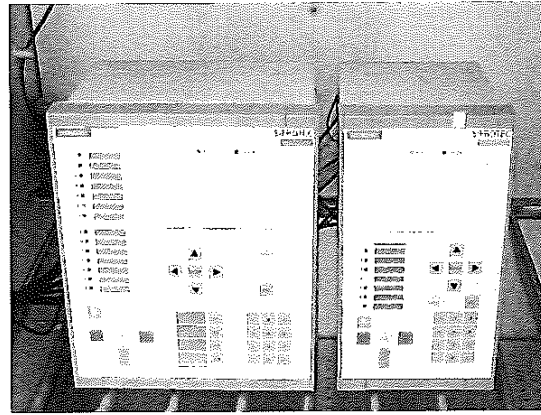


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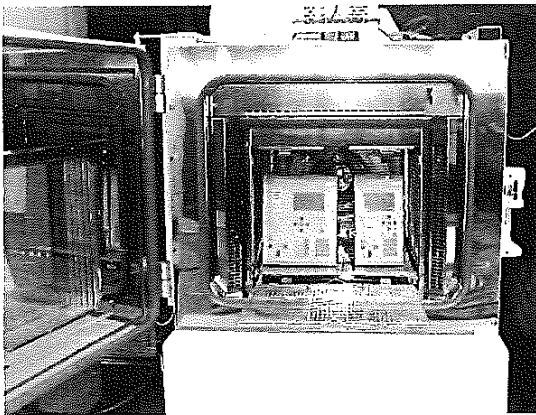
**Pictures**



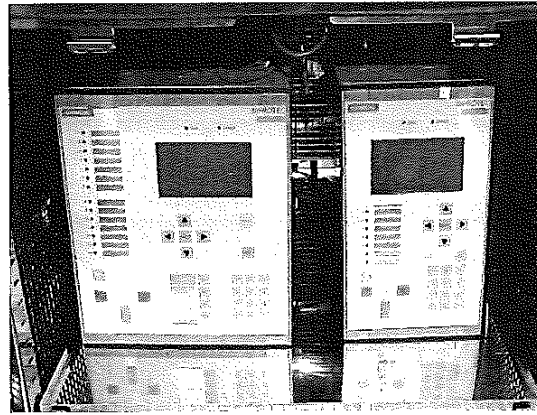
**picture 1**  
Protection Relay Overcurrent Protection 7SJ663  
and Overcurrent Protection 7SJ662  
in climatic chamber KPK 4  
during the climatic tests



**picture 2**  
Protection Relay Overcurrent Protection 7SJ663  
and Overcurrent Protection 7SJ662  
in climatic chamber KPK 4  
during the climatic tests



**picture 3**  
Protection Relay Overcurrent Protection 7SJ663  
and Overcurrent Protection 7SJ662  
in temperature shock chamber TSS 66  
during the temperature shock test



**picture 4**  
Protection Relay Overcurrent Protection 7SJ663  
and Overcurrent Protection 7SJ662  
in temperature shock chamber TSS 66  
during the temperature shock test

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Testing laboratory for climatic, mechanical  
and corrosive environmental stress



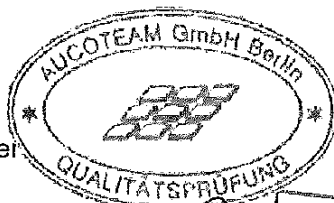
Deutsche  
Akkreditierungsstelle  
D-PL-19102-01-00

## CERTIFICATE of QUALITY TEST

Test report No. 10220.02 / 13

Client	<b>Siemens AG</b> <b>IC SG EA PRO D 6 2</b> Wernerwerkdamm 5 13629 Berlin	
Equipment under test	<b>Protection Relay</b> specimen 3	<b>Overcurrent Protection 7SJ663</b> 1/2 of 19" for panel flush mounting
	<b>Protection Relay</b> specimen 4	<b>Overcurrent Protection 7SJ662</b> 1/3 of 19" for panel flush mounting
Purpose	<b>Test of the climatic resistance and of the operability</b> according to the standards and to the demands of the client	
Test program	<b>Damp heat, steady state</b> according to IEC 60068-2-78 and IEC 60255-1	
Test period	11 November 2013 to 7 January 2014	
Realization / results	see page 2 to 3	
Total number of pages	5 pages (including 2 appendices)	
Test result	<p>The tests of the climatic resistance and of the operability were realized according to the test program.</p> <p>Neither damages nor noticeable problems were determined.</p> <p>The further evaluation will be done by the client.</p>	

На основании чл.36а ал.3 от  
ЗОП

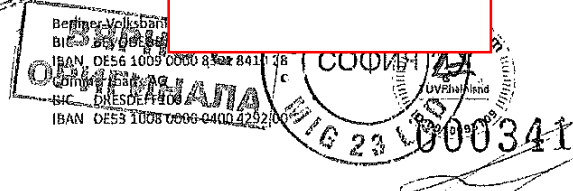


На основании чл.36а ал.3 от  
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Ust.-ID-Nr. DE 137 190 620  
Geschäftsführer:  
Dipl.-Ing. Bernd Pflümel  
Dipl.-Ing. Werner Zuchholz

Berliner Volksbank  
BIC: BVSB3333  
IBAN: DE56 1009 0000 8502 8410 18  
BIC: DRESDE33  
IBAN: DE55 1008 0000 0400 4292 100



**1 Purpose**

Test of the climatic resistance and of the operability according to the standards and to the demands of the client.

**2 Equipment under test (EUT)**

<b>Protection Relay</b>	<b>Overcurrent Protection 7SJ663</b>
specimen 3	Prototype 021
model	1/2 of 19" for panel flush mounting
MLFB	7SJ6632-5KB90-3RH7-L0R/BB
Firmware	V04.00.03
DIGSI-Software	V4.88

**Module in Device 7SJ663**

1. Display Board with the serial Number 600000 245043
2. Current / Voltage input Board M102/3/6 - 2 with the serial Number 600000 245123
3. Power supply Board PS BO OB – 230 AC with the serial Number CB1311000174
4. BIO Board with the serial Number 600000 208677
5. BIO Board with the serial Number 600000 208676
6. CPU Board with the serial Number 600000 245060
7. ETH Board with the serial Number 600000 238963
8. BIO Board with the serial Number 600000 255772

**Settings in Device 7SJ663**

1. Overcurrent  $\geq 10\%$ ; configured to LED 1
2. Overvoltage  $\geq 10\%$ ; configured to LED 2
3. Undervoltage  $\leq 10\%$ ; configured to LED 3
4. Binary Input (BI): BI 1; BI3 – BI13; BI15 – BI25; BI27 – BI36 high active
5. BI2; BI 14; BI 26 low active
6. Binary Output (BO) BO4; BO6; BO7 are supervised

<b>Protection Relay</b>	<b>Overcurrent Protection 7SJ663</b>
specimen 4	Prototype 008
model	1/3 of 19" for panel flush mounting
MLFB	7SJ6621-5KB90-3HG7-L0D/BB
Firmware	V04.00.03
DIGSI-Software	V4.88

**Module in Device 7SJ662**

1. Display Board with the serial Number 600000 254760
2. Current / Voltage input Board M102/3/6 - 2 with the serial Number 000 245116
3. Power Supply Board PS BO OB – 230 AC with the serial Number CB1311000175
4. EXT. BIO Board with the serial Number 600000 255789
5. BI Board with the serial Number 600000 245100
6. CPU Board with the serial Number 600000 245053
7. ETH Board with the serial Number 600000 049730

**Settings in Device 7SJ662**

1. Overcurrent  $\geq 10\%$ ; configured to LED 1
2. Overvoltage  $\geq 10\%$ ; configured to LED 2
3. Undervoltage  $\leq 10\%$ ; configured to LED 3
4. Binary Input (BI): BI 1; BI3 – BI8; BI10 – BI17; BI19 – BI21 high active
5. BI2; BI9; BI 18 low active
6. Binary Output (BO): BO4; BO6; BO7 are supervised

delivery date of the EUT 11 November 2013



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### 3 Basics

#### 3.1 Demands of the client

#### 3.2 Used standards

IEC 60068-1:1988 + Corr. 1988 + A1:1992      DIN EN 60068-1:1995-03  
 „Environmental testing - Part 1: General and guidance“  
 IEC 60068-2-78:2001      DIN EN 60068-2-78:2002-09  
 „Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state“  
 IEC 60255-1:2010      DIN EN 60255-1; VDE 0435-300:2010-09  
 „Measuring relays and protection equipment - Part 1: Common requirements“

### 4 Test program

#### Damp heat, steady state – test Cab

according to IEC 60068-2-78 and IEC 60255-1

specimens	operating with measurements AC 57 V; 1.0 A and 50 Hz connected test equipment of the client
test temperature	(+40 ± 2)°C
relative humidity	(93 ± 3) %
test duration	1344:00 h      (56 d)
temperature rate	1.00 K/min

After the test, the specimens shall be stored at standard conditions (+20 ° C, 30% relative humidity) for at least 2:00 h.

### 5 Realization

The environmental test was carried out one by one according to the program of testing methods (complex 4), according to the standards and to the demands of the client. The test was realized one by one according to the test sequence.

#### Visual inspection

Before and after the test, each specimen was examined visually for cracks, breaks, distortions, mechanical and thermal damages.

#### Functional test

Before, during and after the test, a functional test was realized.

#### Measuring and test equipment

climatic chamber 1      KPK 600 (SN: 132/90, Feutron)

#### Test equipment of the client

Bremer-Transformator; Type BV 26929; Inv-No P.203855  
 Omicron; Type CMC 156; Inv. No 6500 0103

### 6 Results

During and after the climatic tests of the

**Protection Relay Overcurrent Protection 7SJ663 (Prototype 021) and  
 Protection Relay Overcurrent Protection 7SJ662 (Prototype 008) with**

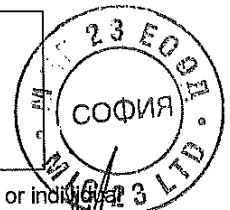
**- Damp heat, steady state (+40°C, 93 % r. h. 1344 h operating)**

**- Test Cab**

neither cracks, breaks, distortions nor any other thermal damages were determined.

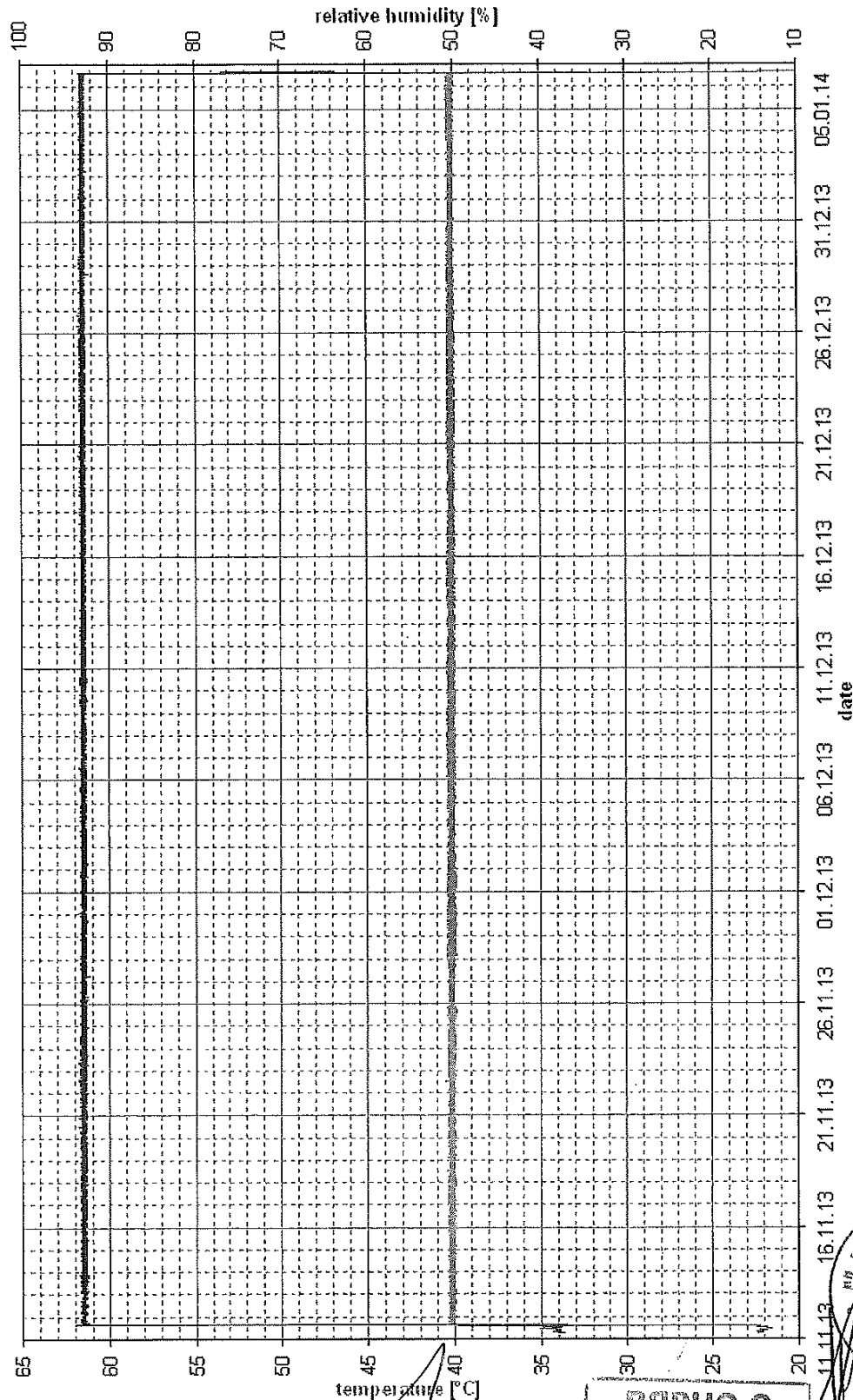
The operability of both specimens was ensured at any time before, during and after each test.

**The tests of the climatic resistance and of the operability  
 were realized according to the test program.  
 Neither damages nor noticeable problems were determined.  
 The further evaluation will be done by the client.**



The results of the test only refer to the above mentioned equipment under test. The report or individual pages of this testing report may only be copied following the written consent of the testing laboratory. This testing report-No. 10220.02 / 13 includes 3 pages and appendix 1 to 2  
 appendix 1 - climatic protocols      appendix 2 - pictures

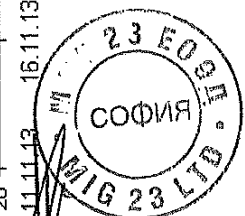
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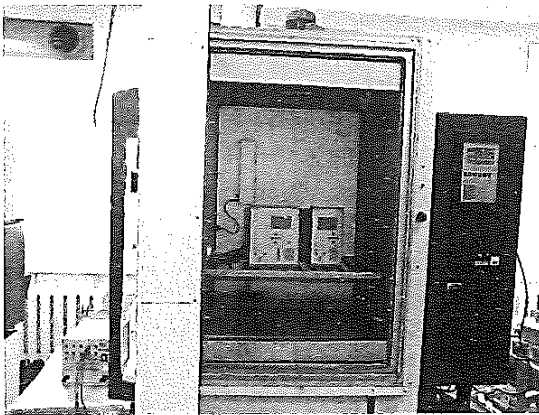
Climatic behavior of climatic test chamber KPK 1 during the tests with damp heat, steady state

ВАРНО С  
ОРИГИНАЛ

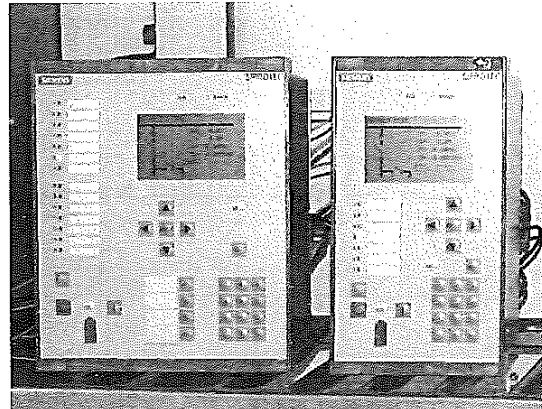
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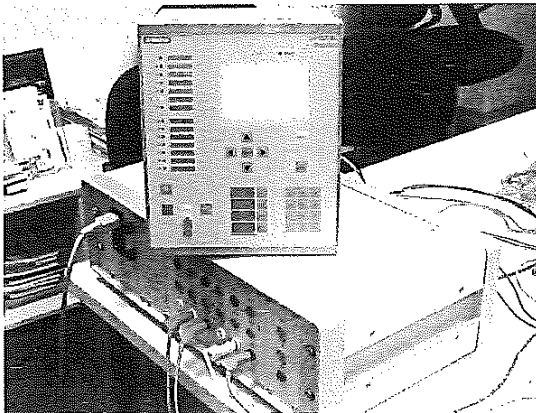
**Pictures**



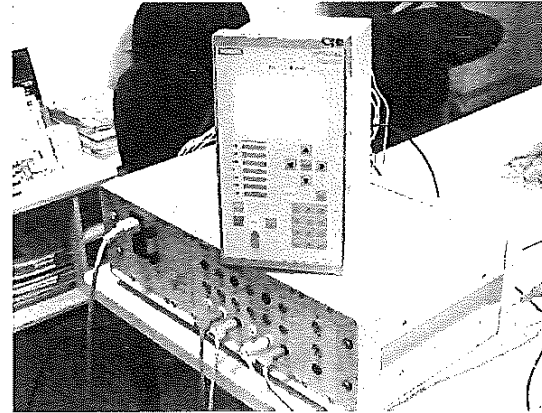
**picture 1**  
Protection Relay Overcurrent Protection 7SJ663  
and Overcurrent Protection 7SJ662  
in climatic chamber KPK 1 with test equipment  
during the climatic test



**picture 2**  
Protection Relay Overcurrent Protection 7SJ663  
and Overcurrent Protection 7SJ662  
in climatic chamber KPK 1  
during the climatic test



**picture 3**  
Protection Relay Overcurrent Protection 7SJ663  
with test equipment of the client  
during the final functional test

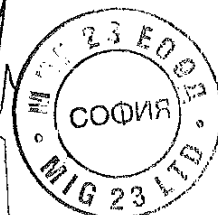


**picture 4**  
Protection Relay Overcurrent Protection 7SJ6632  
with test equipment of the client  
during the final functional test

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Testing laboratory for climatic, mechanical and corrosive environmental stress



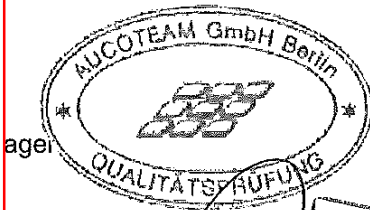
Deutsche Akkreditierungsstelle D-PL-19102-01-00

# CERTIFICATE of QUALITY TEST

Test report - No. 10220.03 / 13

Client	<b>Siemens AG</b> Infrastructure & Cities Sector IC SG EA PRO D 6 2 Wernerwerkdam 5 13629 Berlin	
Equipment under test	<b>Protection Relay</b> specimen 7 and 9	<b>Overcurrent Protection 7SJ663</b> 1/2 of 19" for panel flush mounting
	<b>Protection Relay</b> specimen 8 and 10	<b>Overcurrent Protection 7SJ662</b> 1/3 of 19" for panel flush mounting
Purpose	<b>Environmental Test of the normal service and transportability</b>	
Test program	<b>Vibration</b> according to IEC 60068-2-6 / IEC 60255-21-1 <b>Shock</b> according to IEC 60068-2-27 / IEC 60255-21-2 <b>Seismic test</b> according to IEC 60068-3-3 / IEC 60255-21-3	
Test period	6 January to 9 January 2014	
Realization / results	see page 2 to 6	
Total number of page	14 (inclusive 2 appendixes)	
Test result	<p><b>The tests of the normal service and transportability under defined conditions of the Protection Relays were realized according to the standards.</b></p> <p><b>Neither damages nor noticeable problems were determined.</b></p> <p><b>The further evaluation will be done by the client.</b></p>	

На основании чл.36а ал.3 от ЗОП



На основании чл.36а ал.3 от ЗОП

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## 1 Purpose

Environmental test of the dynamic-mechanical robustness and of the operability of the **Protection Relays** under defined normal service and transport conditions according to the standards.

## 2 Equipment under test (EUT)

<b>Protection Relay</b>	<b>Overcurrent Protection 7SJ663</b>
specimen 7	Protoype 004
specimen 9	Protoype 027
model	1/2 of 19" for panel flush mounting
MLFB	7SJ6632-5KB90-3RH7-L0R/BB
Firmware	V04.00.03
DIGSI-Software	V4.88

### Module in Device 7SJ663

1. Display Board with the serial Number 600000 245043
2. Current / Voltage input Board M102/3/6 - 2 with the serial Number 600000 245123
3. Power supply Board PS BO OB – 230 AC with the serial Number CB1311000174
4. BIO Board with the serial Number 600000 208677
5. BIO Board with the serial Number 600000 208676
6. CPU Board with the serial Number 600000 245060
7. ETH Board with the serial Number 600000 238963
8. BIO Board with the serial Number 600000 255772

### Settings in Device 7SJ663

1. Overcurrent  $\geq 10\%$ ; configured to LED 1
2. Overvoltage  $\geq 10\%$ ; configured to LED 2
3. Undervoltage  $\leq 10\%$ ; configured to LED 3
4. Binary Input (BI): BI 1; BI3 – BI13; BI15 – BI25; BI27 – BI36 high active
5. BI2; BI 14; BI 26 low active
6. Binary Output (BO) BO4; BO6; BO7 are supervised

<b>Protection Relay</b>	<b>Overcurrent Protection 7SJ663</b>
specimen 8	Protoype 001
specimen 10	Protoype 002
model	1/3 of 19" for panel flush mounting
MLFB	7SJ6621-5KB90-3HG7-L0D/BB
Firmware	V04.00.03
DIGSI-Software	V4.88

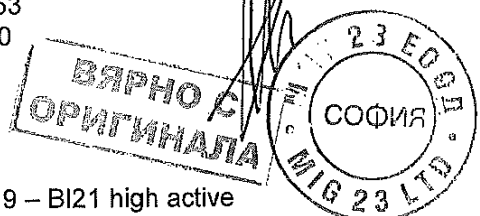
### Module in Device 7SJ662

1. Display Board with the serial Number 600000 254760
2. Current / Voltage input Board M102/3/6 - 2 with the serial Number 000 245116
3. Power Supply Board PS BO OB – 230 AC with the serial Number CB1311000175
4. EXT. BIO Board with the serial Number 600000 255789
5. BI Board with the serial Number 600000 245100
6. CPU Board with the serial Number 600000 245053
7. ETH Board with the serial Number 600000 049730

### Settings in Device 7SJ662

1. Overcurrent  $\geq 10\%$ ; configured to LED 1
2. Overvoltage  $\geq 10\%$ ; configured to LED 2
3. Undervoltage  $\leq 10\%$ ; configured to LED 3
4. Binary Input (BI): BI 1; BI3 – BI8; BI10 – BI17; BI19 – BI21 high active
5. BI2; BI9; BI 18 low active
6. Binary Output (BO): BO4; BO6; BO7 are supervised

delivery date of the EUT 11 November 2013



000347

### 3 Basics

#### 3.1 Demands of the client

#### 3.2 Used standards

**IEC 60068-2-6:2007**  
"Environmental testing - Part 2-6"  
**IEC 60068-2-27:2008**  
"Environmental testing - Part 2-27"  
**IEC 60068-2-47:2005**  
"Environmental testing - Part 2-47"  
  
**IEC 60068-3-3 / 1991** and  
"Environmental testing -"  
**IEC 60255-21-1 / 1988**  
**IEC 60255-21-2 / 1988**  
**IEC 60255-21-3 / 1993**

**DIN EN 60068-2-6; VDE 0468-2-6:2008-10**  
Tests - Test Fc: Vibration (sinusoidal)"  
**DIN EN 60068-2-27; VDE 0468-2-27:2010-02**  
Tests - Test Ea and guidance: Shock"  
**DIN EN 60068-2-47:2006-03**  
Tests - Mounting of specimens for vibration,  
impact and similar dynamic tests"  
**DIN IEC 60068-3-3 / 09.93**  
Seismic tests for equipment"  
"Electrical relays - Vibration sinusoidal"  
"Electrical relays - Shock and bump"  
"Electrical relays - Seismic tests"

### 4 Test program

#### 4.1 Vibration, sinusoidal – test Fc (transport and storage)

*according to IEC 60068-2-6 / IEC 60255-21-1, class 2*

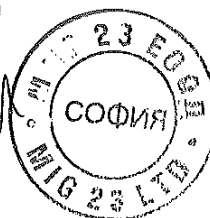
specimens 7 and 8	non operating
frequency range	5 Hz - 150 Hz
vibration amplitude	± 7.5 mm (below 8 Hz)
acceleration	20 m/s <sup>2</sup> (2 g) (above 8 Hz)
sweep rate	1 octave/min
number of axes	3 (each shifted by 90°)
test duration	10:00 h (20 cycles per axis / 3 x 3:20 h)

#### 4.2 Vibration, sinusoidal – test Fc (stationary use)

*according to IEC 60068-2-6 / IEC 60255-21-1, class 2*

specimens 7 and 8	operating with measurements AC 57 V; 1.0 A and 50 Hz connected test equipment of the client
frequency range	10 Hz - 150 Hz
vibration amplitude	± 0.075 mm (below 58 Hz)
acceleration	10 m/s <sup>2</sup> (1 g) (above 58 Hz)
sweep rate	1 octave/min
number of axes	3 (each shifted by 90°)
test duration	8:00 h (20 cycles per axis / 3 x 2:40 h)

ВЯРНО С  
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000348

**4.3 Shock, half-sine – test Ea (resistance)**

according to IEC 60068-2-27 / IEC 60255-21-2, class 1

specimens 9 and 10	non operating
pulse shape	half-sine
acceleration	150 m/s <sup>2</sup> (15 g)
pulse duration	11 ms
number of directions	6 (3 axes, each shifted by 90° and with 2 directions)
test duration	18 shocks (3 shocks per direction)

**4.4 Bump, half-sine – test Ea (transport and storage)**

according to IEC 60068-2-29 / IEC 60255-21-2, class 1

specimens 9 and 10	non operating
acceleration	100 m/s <sup>2</sup> (10 g)
pulse duration	16 ms
number of directions	6 (3 axes, each shifted by 90° and with 2 directions)
test duration	6000 shocks (1000 shocks per direction)

**4.5 Shock, half-sine – test Ea (stationary use)**

according to IEC 60068-2-27 / IEC 60255-21-2, class 1

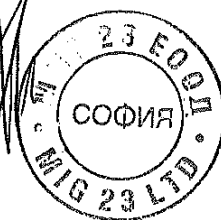
specimens 9 and 10	operating with measurements AC 57 V; 1.0 A and 50 Hz connected test equipment of the client
acceleration	50 m/s <sup>2</sup> (5 g)
pulse duration	11 ms
number of directions	6 (3 axes, each shifted by 90° and with 2 directions)
test duration	60 shocks (10 shocks per direction)

**4.6 Seismic tests – test Fc (stationary use)**

according to IEC 60068-3-3 / IEC 60255-21-3, class 2

specimens 9 and 10	operating with measurements AC 57 V; 1.0 A and 50 Hz connected test equipment of the client
frequency range	3 Hz - 35 Hz
crossover frequency	8 Hz - 9 Hz
vibration amplitude / acceleration	± 8 mm / 20 m/s <sup>2</sup> (2 g) (horizontal axis - X and Z) ± 4 mm / 10 m/s <sup>2</sup> (1 g) (vertical axis - Y)
sweep rate	1 octave/min
number of axes	3 (each shifted by 90°)
test duration	1:00 h (1 cycle per axis / 3 x 0:20 h)

ВЯРНО С  
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## 5 Realization

The environmental tests were carried out one by one according to the program of testing methods (complex 4.1 to 4.6), according to the standards and to the demands of the client. The tests were performed according to the demands of the client as following:

### **dynamic-mechanical tests of specimens 7 and 8**

vibration, sinusoidal, Y-axis	test Fc (transport and storage)	complex 4.1
vibration, sinusoidal, X-axis	test Fc (transport and storage)	complex 4.1
vibration, sinusoidal, Z-axis	test Fc (transport and storage)	complex 4.1
vibration, sinusoidal, Z-axis	test Fc (stationary use)	complex 4.2
vibration, sinusoidal, X-axis	test Fc (stationary use)	complex 4.2
vibration, sinusoidal, Y-axis	test Fc (stationary use)	complex 4.2

### **dynamic-mechanical tests of specimens 9 and 10**

shock, half-sine, Y-axis	test Ea (resistance)	complex 4.3
bump, half-sine, Y-axis	test Ea (transport and storage)	complex 4.4
shock, half-sine, X-axis	test Ea (resistance)	complex 4.3
bump, half-sine, X-axis	test Ea (transport and storage)	complex 4.4
shock, half-sine, Z-axis	test Ea (resistance)	complex 4.3
bump, half-sine, Z-axis	test Ea (transport and storage)	complex 4.4
shock, half-sine, Z-axis	test Ea (stationary use)	complex 4.5
seismic test, Z-axis	test Fc (stationary use)	complex 4.6
shock, half-sine, X-axis	test Ea (stationary use)	complex 4.5
seismic test, X-axis	test Fc (stationary use)	complex 4.6
shock, half-sine, Y-axis	test Ea (stationary use)	complex 4.5
seismic test, Y-axis	test Fc (stationary use)	complex 4.6

### **Measuring and test equipment**

shaker	TV59335/AIT-440 (SN: 054-09, TIRA)
control channel 1 (vibr. table)	acceleration sensor 353B34 (SN: 86256, PCB)
control channel 2 (test frame)	acceleration sensor 352C34 (SN: 64428, PCB)
measuring channel 3 (specimen 8 / 10)	acceleration sensor 352C22 (SN: LW135715, PCB) – red
measuring channel 4 (specimen 7 / 9)	acceleration sensor 352C22 (SN: 126372, PCB) – brown
power supply DC	EA-PSI 8160-05R (SN: 1231540004, EA)

### **Test equipment provided by the client**

Laptop Siemens Nixdorf; Type Scenic Mobile 700; Inv No. 6500 0133  
Omicron; Type CMC 156; Inv. No 6500 0103  
Siemens Multizet S; Inv. No. G330168  
Siemens Multizet S; Inv. No. 211051  
Relay Contact Supervision; Type Siemens 09.2012  
Programmable Power Supply; Type EA-PS 18160-04R; Inv. No. 0590

### **Functional test**

Before, partly during and after the test, the functional tests were realized by the client by using hardware test program.

### **Visual inspection**

Before, during and after each test, the respectable specimen was examined for any possible mechanical damages.

### **Fastening of the EUT during vibration and shock**

During the tests the specimens were fixed to two 19"-mounting-rails (top and bottom: C73165-A63-C209-2 without relief cut) also by using M4-screws.

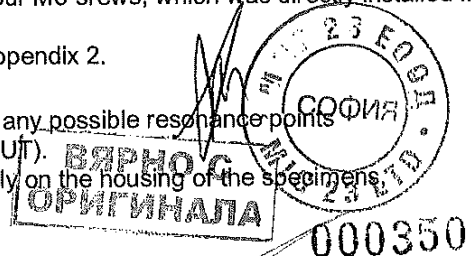
Both mounting rails were mounted to a test frame with four M6-screws, which was directly installed in all three axes on the sliding / vibration table.

The real inset conditions were simulated, see pictures appendix 2.

### **Arrangement of the acceleration sensors**

First of all, the specimen was observed in each axes for any possible resonance points (resonance = 5-times the response acceleration of the EUT).

Each one additional acceleration sensor was fixed directly on the housing of the specimens, see vibration protocols appendix 1.



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## 6 Results

During the tests under normal service and transport conditions of the  
**Protection Relay Overcurrent Protection 7SJ663 (specimen 7 - Prototype 004)** and  
**Protection Relay Overcurrent Protection 7SJ662 (specimen 8 - Prototype 001)** with

- **Vibration, sinusoidal (transport and storage, class 2)** - test Fc
- **Vibration, sinusoidal (stationary use, class 2)** - test Fc

no mechanical damages or any other changes of the test components were found.  
During and after each single test, the operability of the specimens was ensured.

Following acceleration answers was determined:

- **vibration (transport and storage, 5 Hz – 150 Hz, 20 m/s<sup>2</sup> / ±7,5 mm)**

X-axis	124 Hz	30.0 m/s <sup>2</sup>	(1.50-times the response acceleration at housing specimen 7, 7SJ663)
	115 Hz	36.4 m/s <sup>2</sup>	(1.82-times the response acceleration at housing specimen 8, 7SJ662)
Y-axis	88 Hz	90.2 m/s <sup>2</sup>	(4.51-times the response acceleration at housing specimen 7, 7SJ663)
	98 Hz	88.2 m/s <sup>2</sup>	(4.41-times the response acceleration at housing specimen 7, 7SJ663)
	92 Hz	75.8 m/s <sup>2</sup>	(3.79-times the response acceleration at housing specimen 8, 7SJ662)
Z-axis	80 Hz	112.4 m/s <sup>2</sup>	(5.62-times the resonance at the housing of specimen 7, 7SJ663)
	79 Hz	59.2 m/s <sup>2</sup>	(2.96-times the response acceleration at housing specimen 8, 7SJ662)

- **vibration (stationary use, 10 Hz – 150 Hz, 10 m/s<sup>2</sup> / ±0,075 mm)**

X-axis	124 Hz	15.4 m/s <sup>2</sup>	(1.54-times the response acceleration at housing specimen 7, 7SJ663)
	117 Hz	17.5 m/s <sup>2</sup>	(1.75-times the response acceleration at housing specimen 8, 7SJ662)
Y-axis	90 Hz	32.2 m/s <sup>2</sup>	(3.22-times the response acceleration at housing specimen 7, 7SJ663)
	89 Hz	16.6 m/s <sup>2</sup>	(1.66-times the response acceleration at housing specimen 8, 7SJ662)
Z-axis	116 Hz	45.6 m/s <sup>2</sup>	(4.56-times the response acceleration at housing specimen 8, 7SJ662)
	80 Hz	54.8 m/s <sup>2</sup>	(5.48-times the resonance at the housing of specimen 7, 7SJ663)
	80 Hz	29.8 m/s <sup>2</sup>	(2.98-times the response acceleration at housing specimen 8, 7SJ662)

During the tests under normal service and transport conditions of the  
**Protection Relay Overcurrent Protection 7SJ663 (specimen 9 - Prototype 027)** and  
**Protection Relay Overcurrent Protection 7SJ662 (specimen 10 - Prototype 002)** with

- **Shock, half-sine (stationary use, class 1)** - test Ea
- **Shock, half-sine (resistance, class 1)** - test Ea
- **Bump, half-sine (transport and storage, class 1)** - test Ea
- **Seismic test (stationary use, class 2)** - test Fc

no mechanical damages or any other changes of the test components were found.  
During and after each single test, the operability of the specimens was ensured.

Following acceleration answers was determined:

- **seismic test (stationary use, 3 Hz – 35 Hz, 20 m/s<sup>2</sup> (10 m/s<sup>2</sup>) / ± 8 mm (± 4 mm))**

X-axis	no response acceleration at the housing of specimens
Y-axis	no response acceleration at the housing of specimens
Z-axis	no response acceleration at the housing of specimens

**The tests of the normal service and transportability under defined conditions  
of the Protection Relays were realized according to the standards.**

**Neither damages nor noticeable problems were determined.**

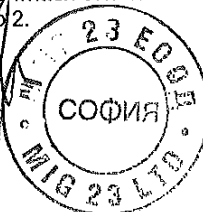
**The further evaluation will be done by the client.**

The results of the test only refer to the above mentioned equipment under test.

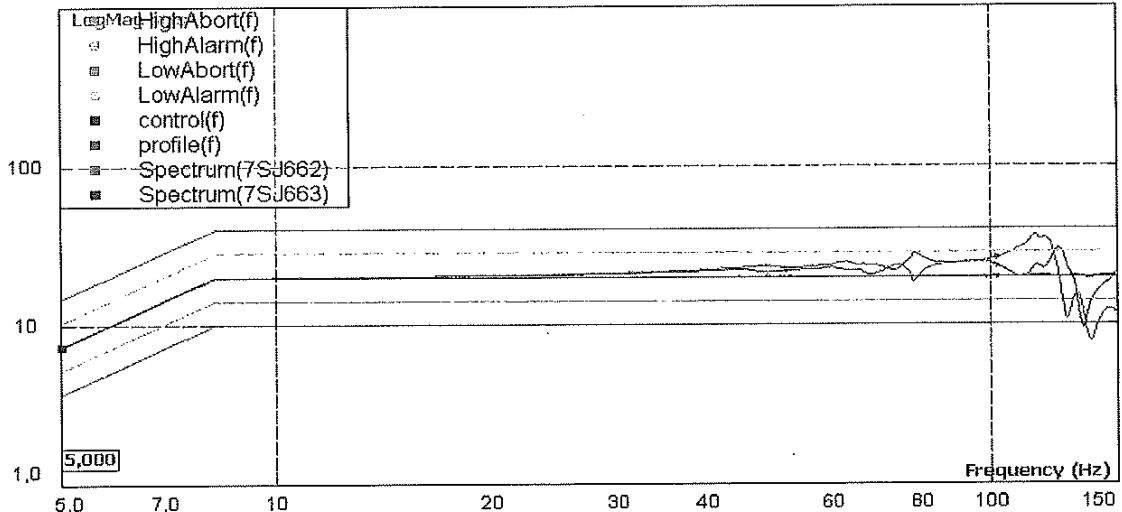
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appendix 1 – vibration and shock protocols

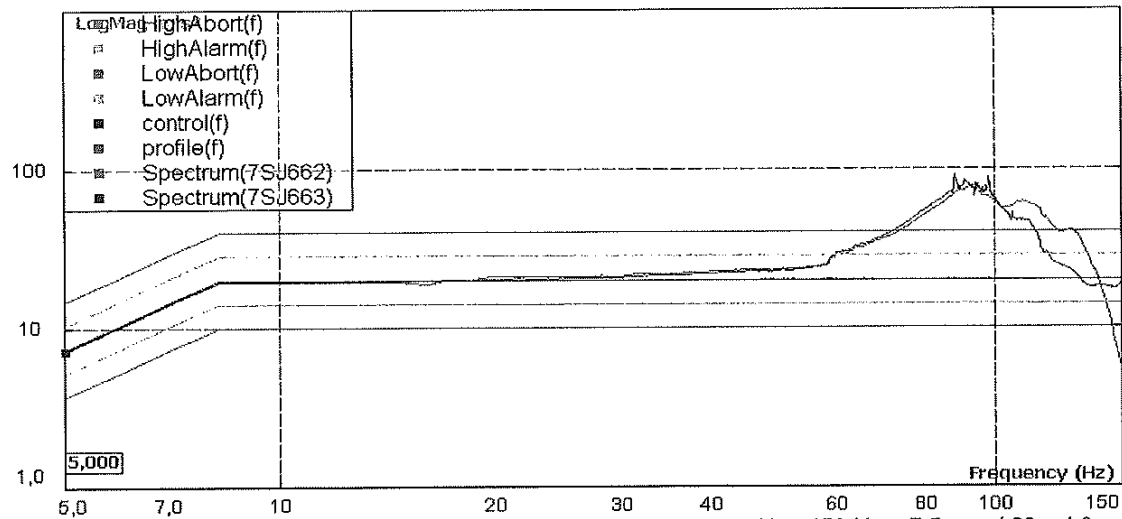
appendix 2 – pictures



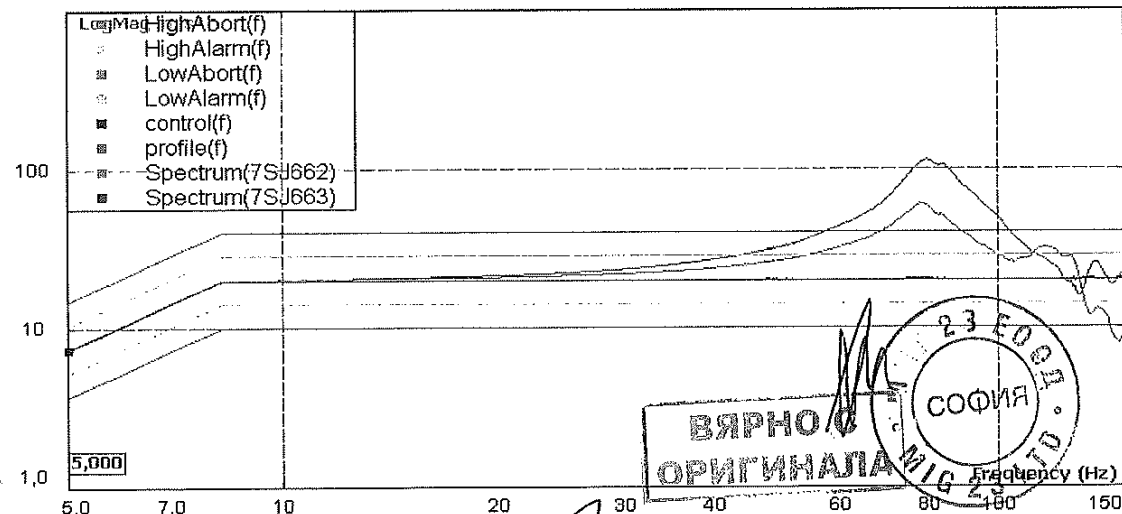
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Vibration, sinusoidal, specimen 7 / 8, X-axis, transport and storage 5 Hz - 150 Hz,  $\pm 7.5$  mm / 20 m/s<sup>2</sup>



Vibration, sinusoidal, specimen 7 / 8, Y-axis, transport and storage 5 Hz - 150 Hz,  $\pm 7.5$  mm / 20 m/s<sup>2</sup>

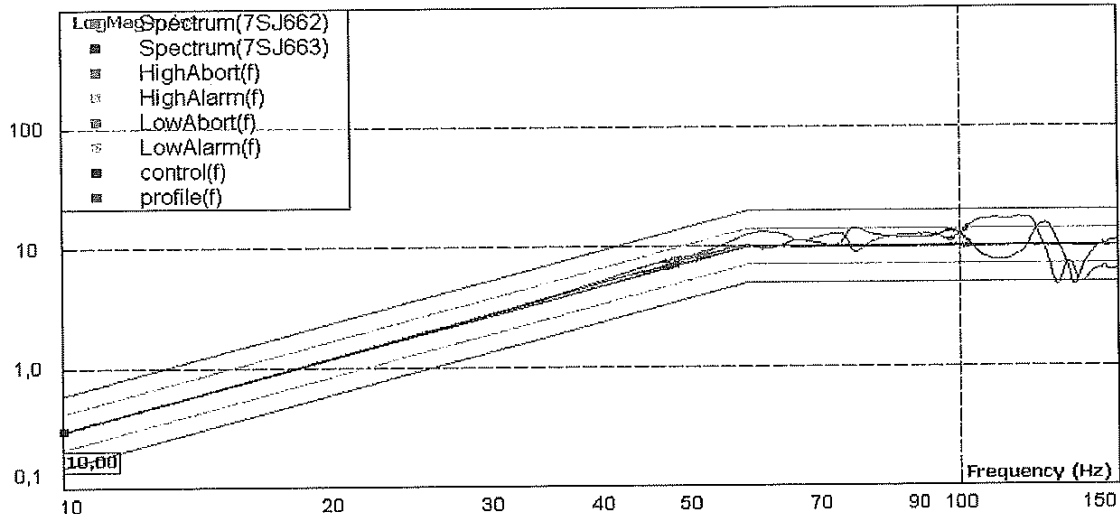


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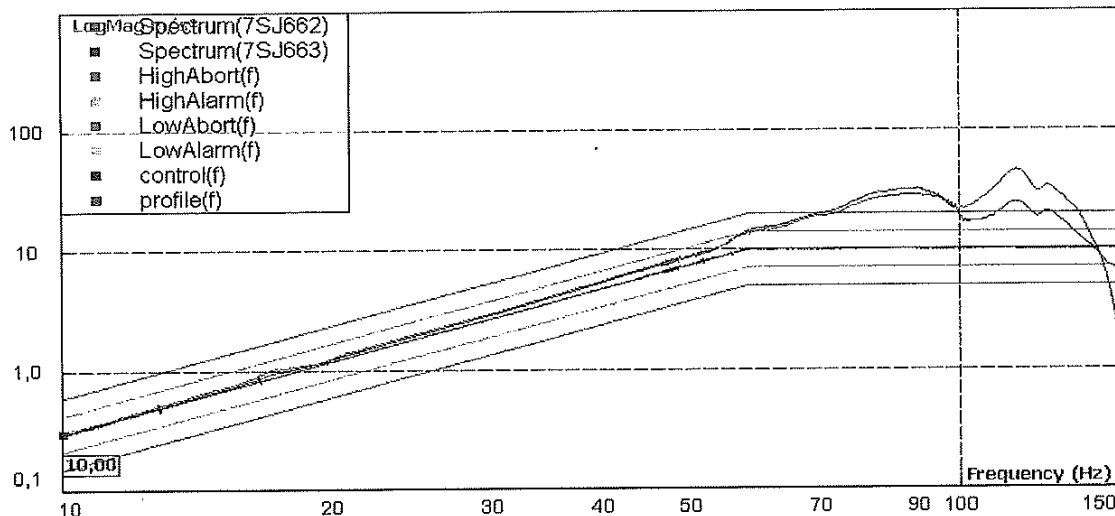
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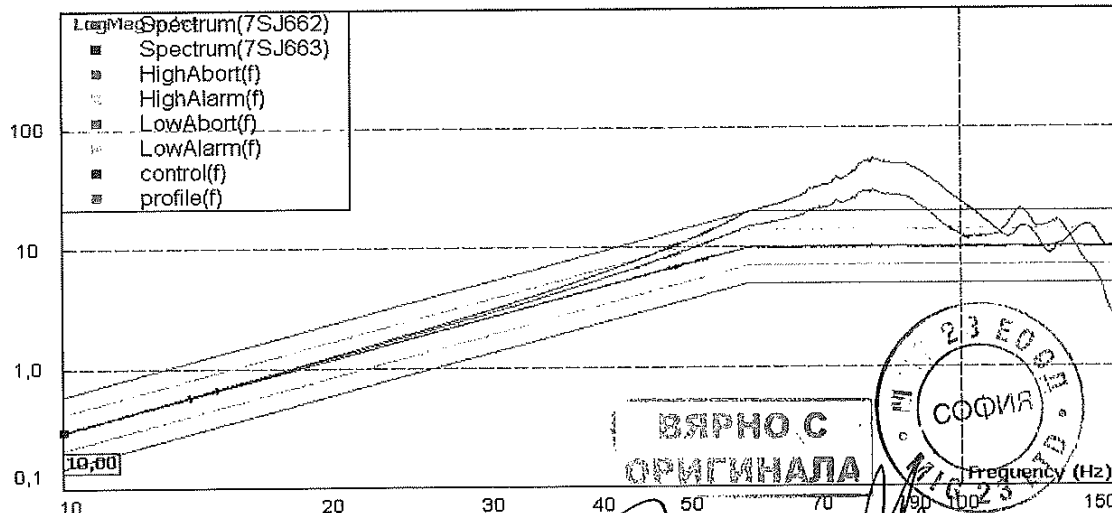
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Vibration, sinusoidal, specimen 7 / 8, X-axis, stationary use 10 Hz - 150 Hz,  $\pm 0.075 \text{ mm} / 10 \text{ m/s}^2$

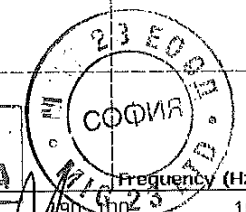


Vibration, sinusoidal, specimen 7 / 8, Y-axis, stationary use 10 Hz - 150 Hz,  $\pm 0.075 \text{ mm} / 10 \text{ m/s}^2$



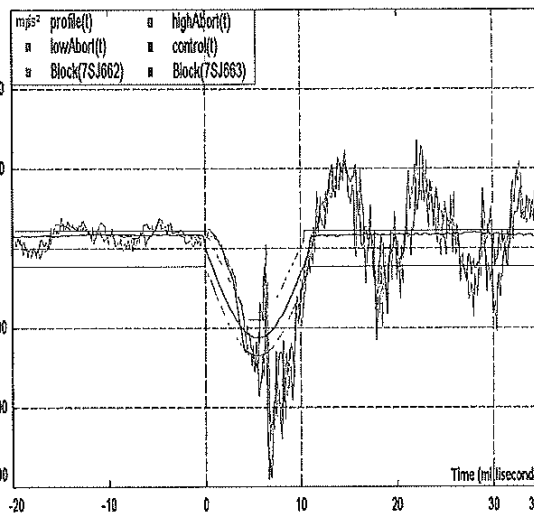
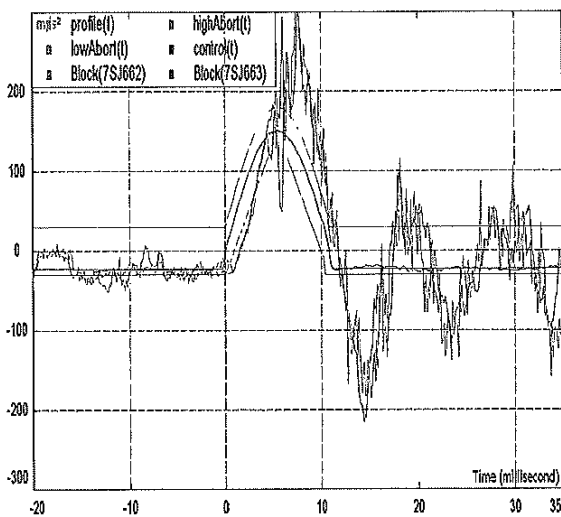
Vibration, sinusoidal, specimen 7 / 8, Z-axis, stationary use 10 Hz - 150 Hz,  $\pm 0.075 \text{ mm} / 10 \text{ m/s}^2$

ВЯРНО С  
ОРИГИНАЛА

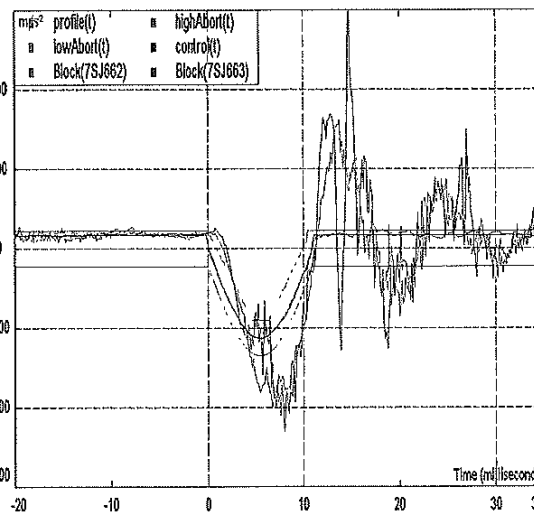
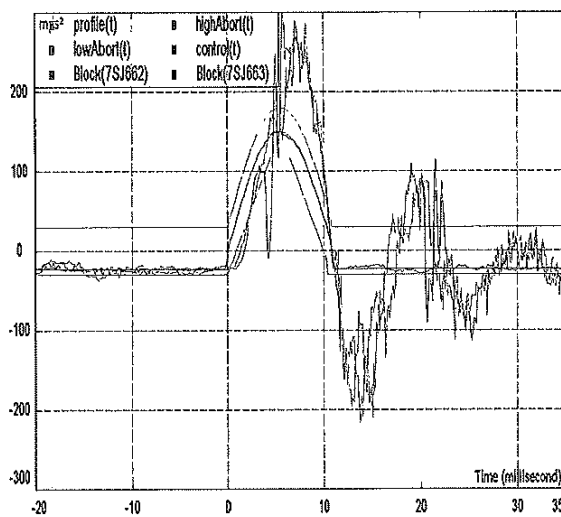


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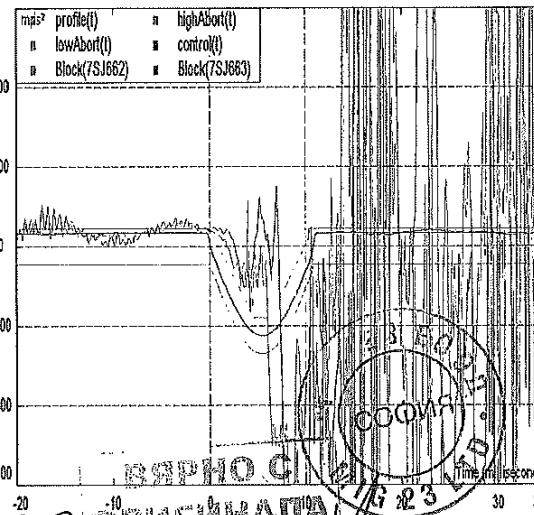
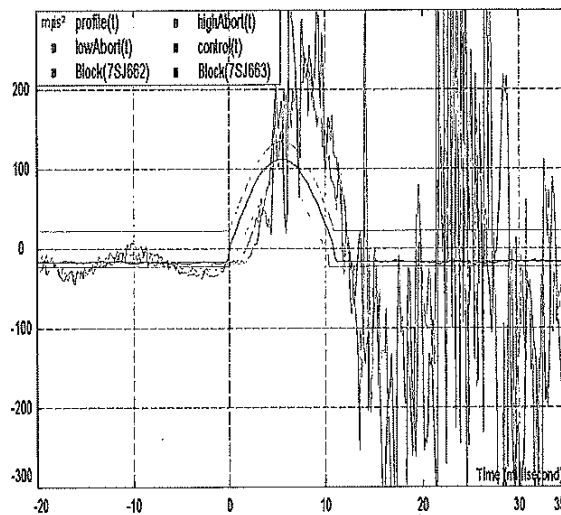




Shock, half-sine, specimen 9 / 10, X-axis, resistance 150 m/s<sup>2</sup>, 11 ms



Shock, half-sine, specimen 9 / 10, Y-axis, resistance 150 m/s<sup>2</sup>, 11 ms

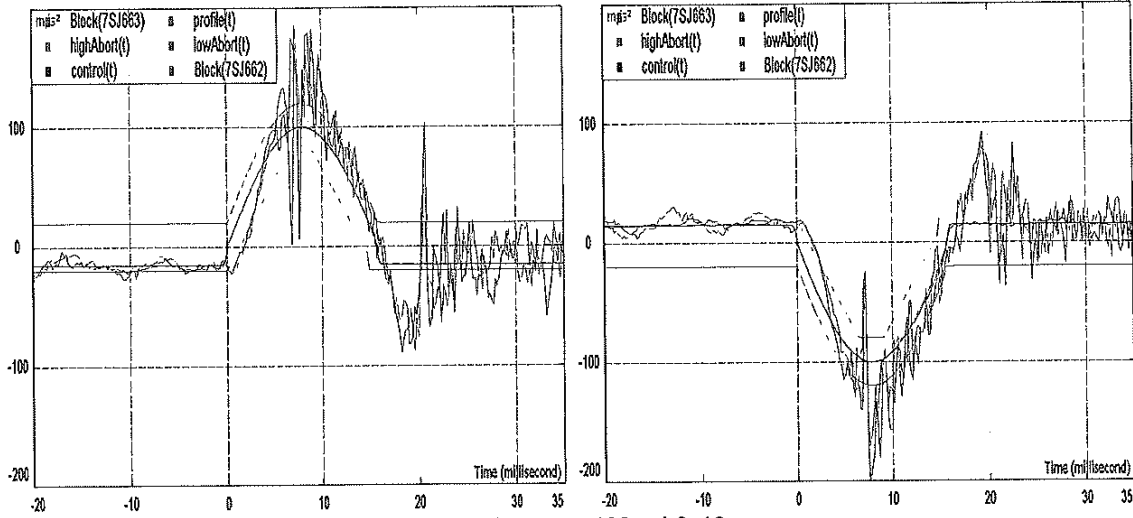


Shock, half-sine, specimen 9 / 10, Z-axis, resistance 150 m/s<sup>2</sup>, 11 ms

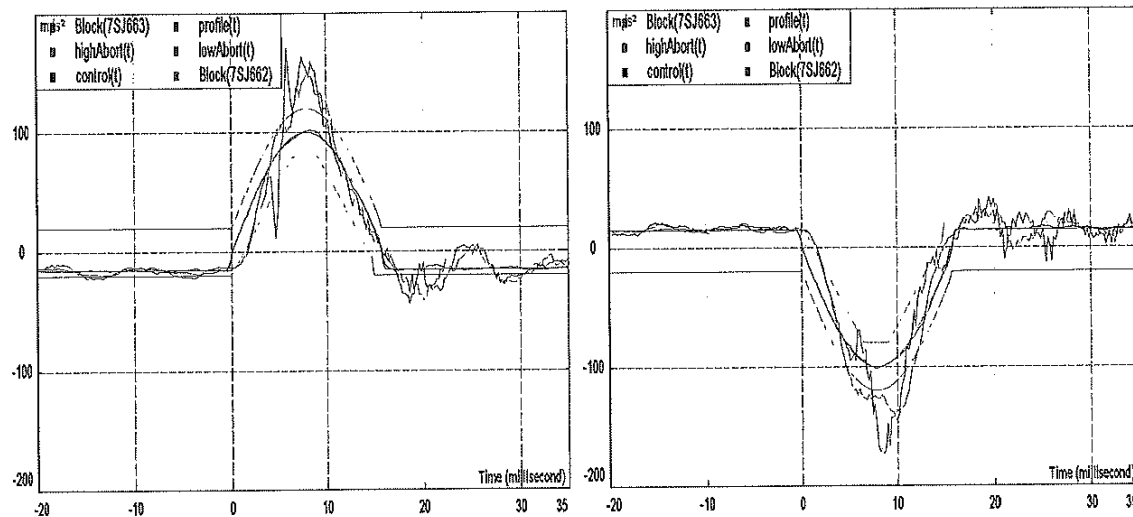
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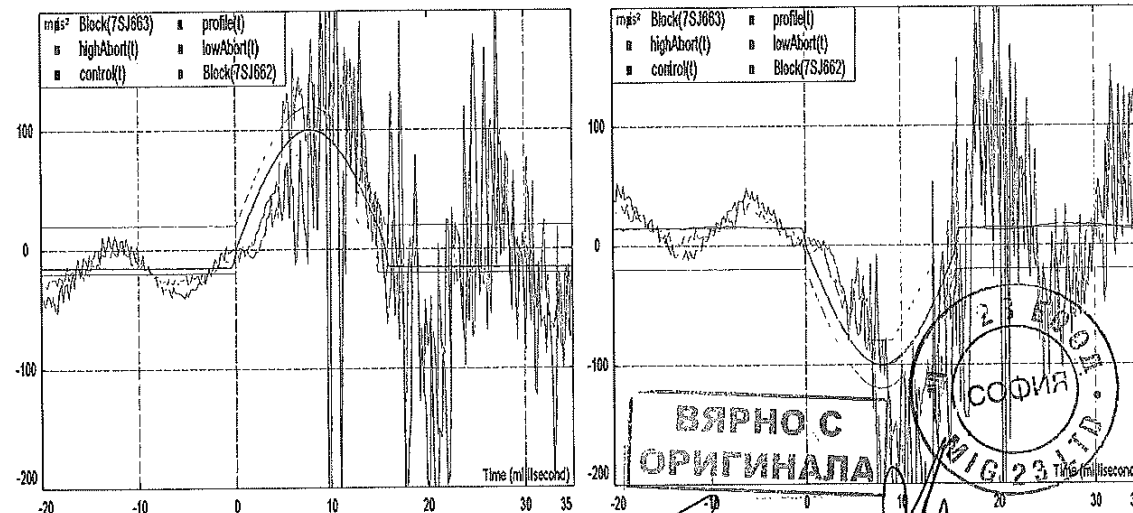
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Bump, specimen 9 / 10, X-axis, transport and storage 100 m/s<sup>2</sup>, 16 ms

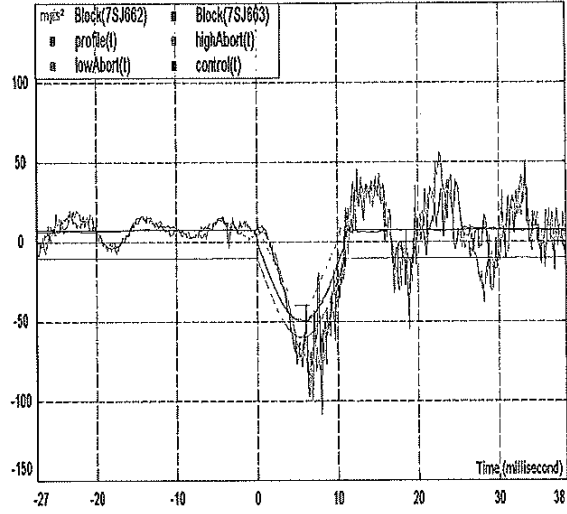
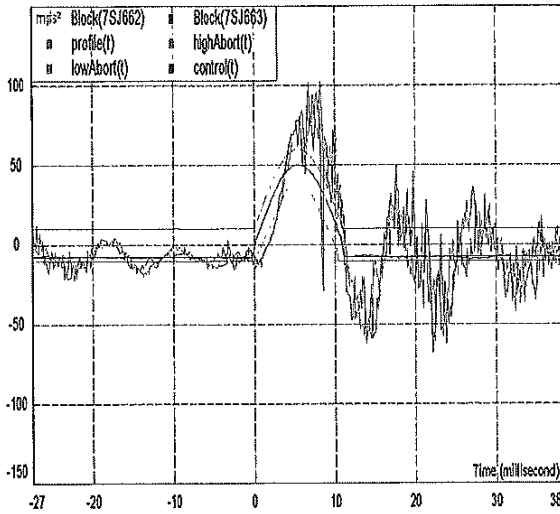


Bump, specimen 9 / 10, Y-axis, transport and storage 100 m/s<sup>2</sup>, 16 ms

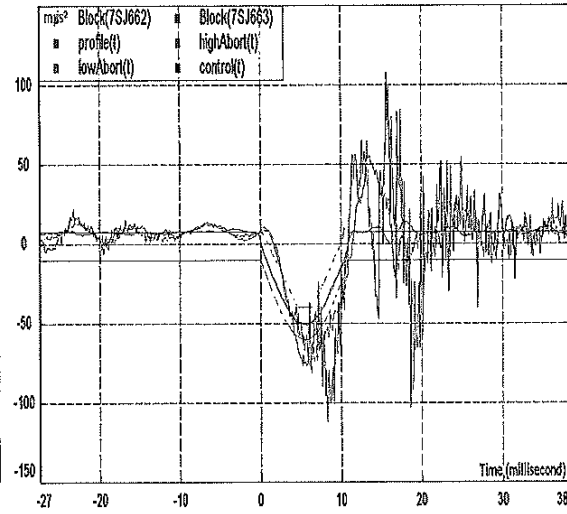
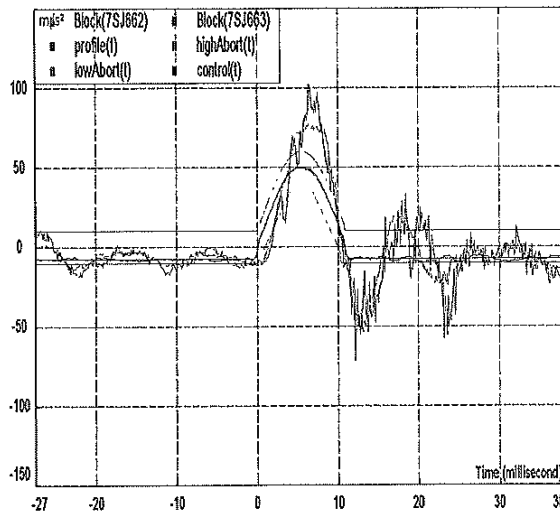


Bump, specimen 9 / 10, Z-axis, transport and storage 100 m/s<sup>2</sup>, 16 ms

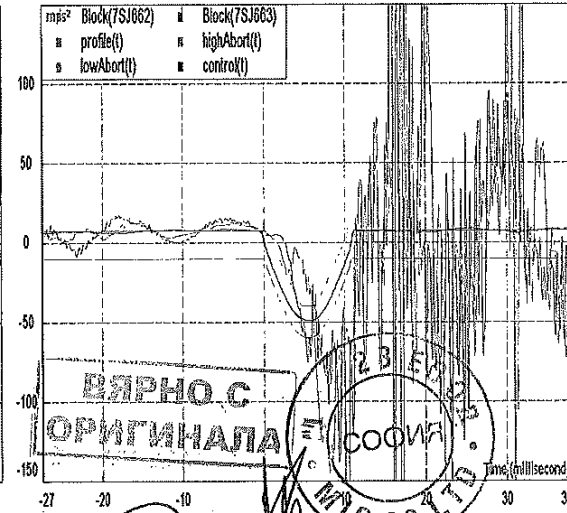
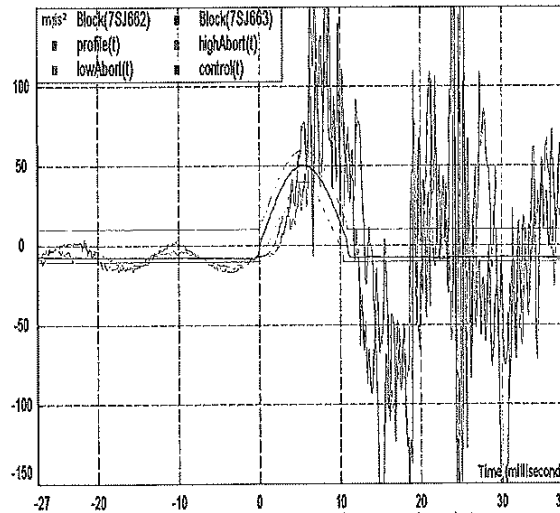
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Shock, half-sine, specimen 9 / 10, X-axis, stationary use 50 m/s<sup>2</sup>, 11 ms



Shock, half-sine, specimen 9 / 10, Y-axis, stationary use 50 m/s<sup>2</sup>, 11 ms



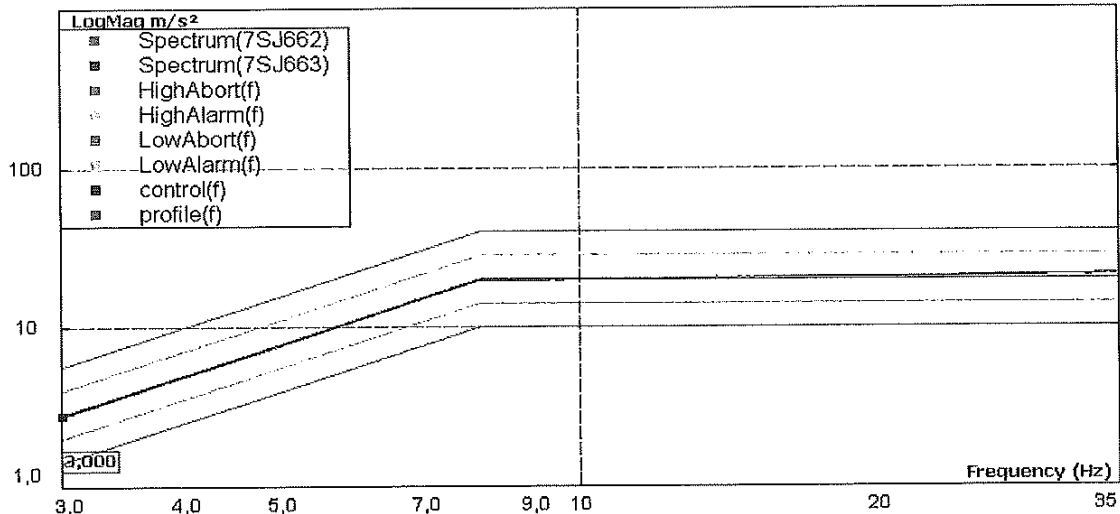
Shock, half-sine, specimen 9 / 10, Z-axis, stationary use 50 m/s<sup>2</sup>, 11 ms

ВЯРНО С  
ОРИГИНАЛА

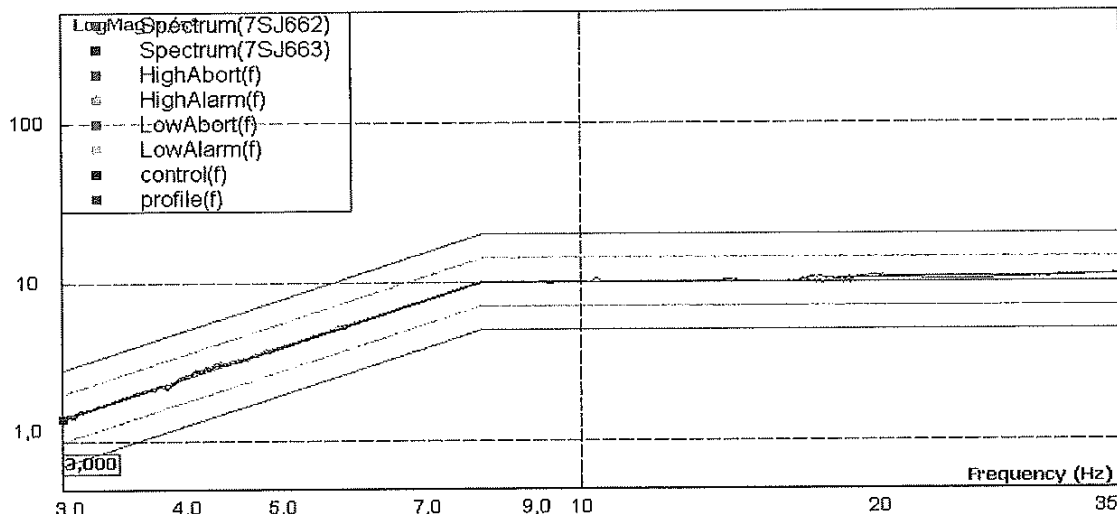
23.05.13

МГ 23.11.13

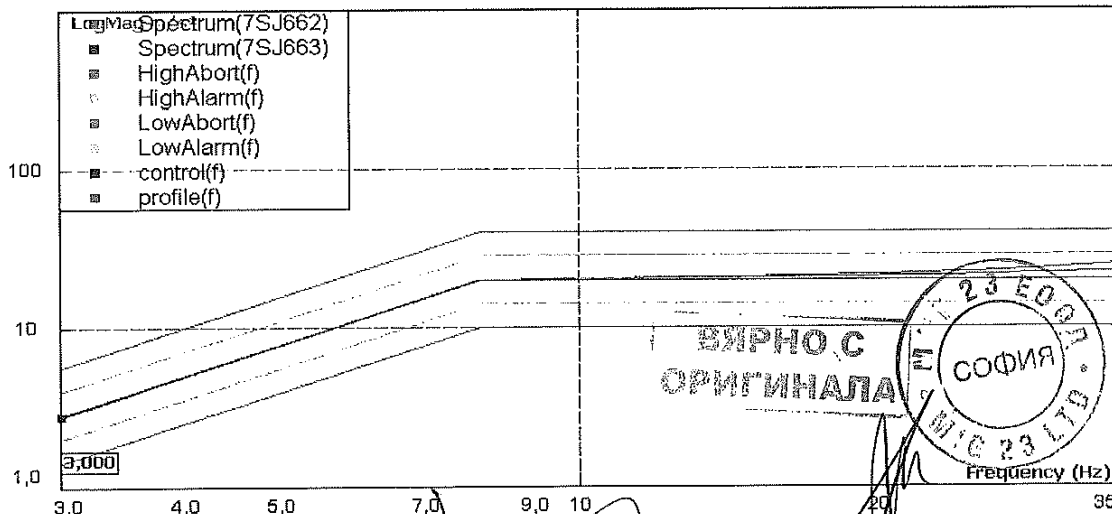
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Seismic test, specimen 9 / 10, X-axis, stationary use 3 Hz - 35 Hz, ±8 mm / 20 m/s<sup>2</sup>



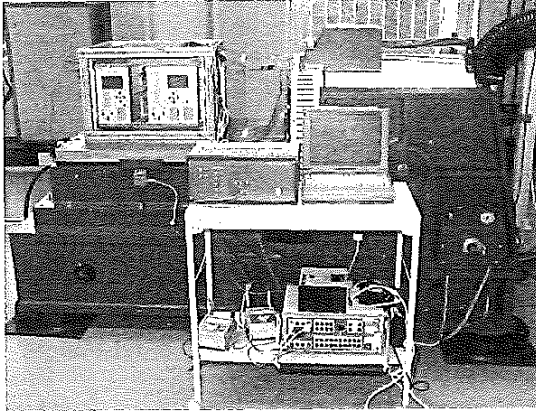
Seismic test, specimen 9 / 10, Y-axis, stationary use 3 Hz - 35 Hz, ±4 mm / 10 m/s<sup>2</sup>



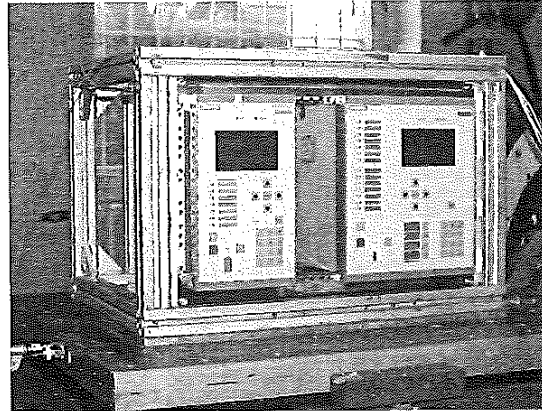
Seismic test, specimen 9 / 10, Z-axis, stationary use 3 Hz - 35 Hz, ±8 mm / 20 m/s<sup>2</sup>

000357

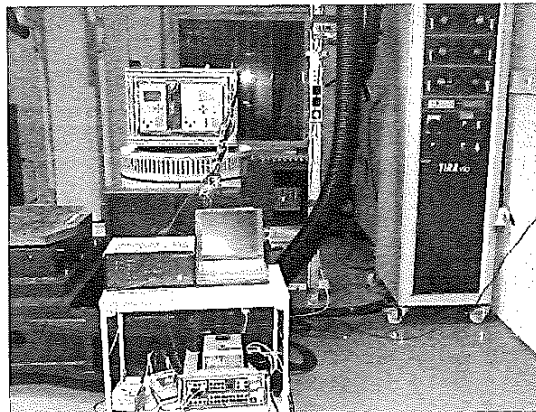
**Pictures**



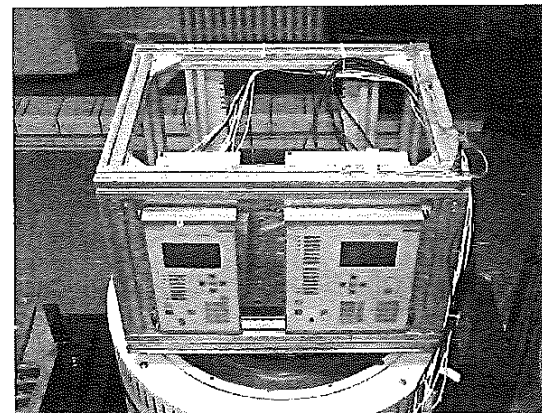
**picture 1**  
Overcurrent Protection 7SJ663 (specimen 7)  
and Overcurrent Protection 7SJ662 (specimen 8)  
on sliding table with test equipment  
*vibration tests in X-axis*



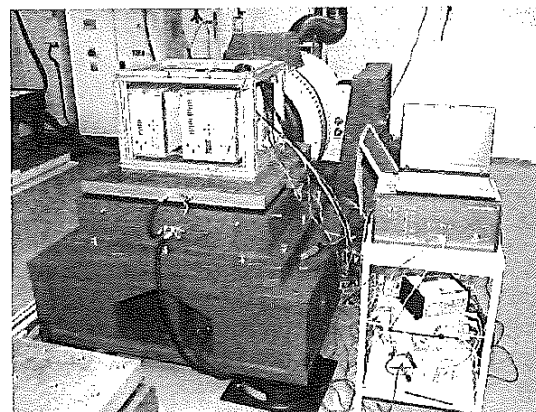
**picture 2**  
Overcurrent Protection 7SJ663 (specimen 7)  
and Overcurrent Protection 7SJ662 (specimen 8)  
on sliding table with acceleration sensors  
*vibration tests in X-axis*



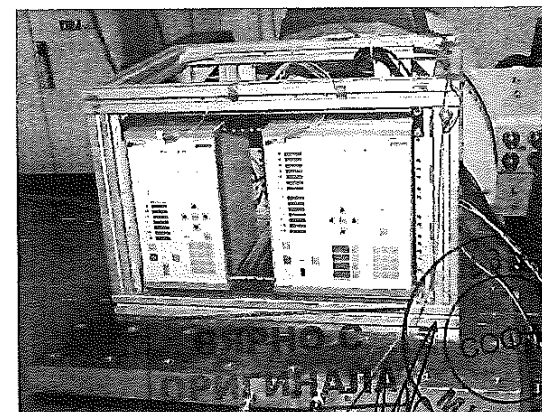
**picture 3**  
Overcurrent Protection 7SJ663 (specimen 7)  
and Overcurrent Protection 7SJ662 (specimen 8)  
on vibration table with test equipment  
*vibration tests in Y-axis*



**picture 4**  
Overcurrent Protection 7SJ663 (specimen 7)  
and Overcurrent Protection 7SJ662 (specimen 8)  
on sliding table with acceleration sensors  
*vibration tests in Y-axis*

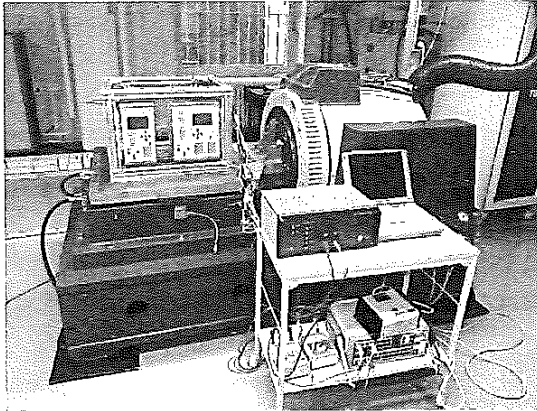


**picture 5**  
Overcurrent Protection 7SJ663 (specimen 7)  
and Overcurrent Protection 7SJ662 (specimen 8)  
on sliding table with test equipment  
*vibration tests in Z-axis*

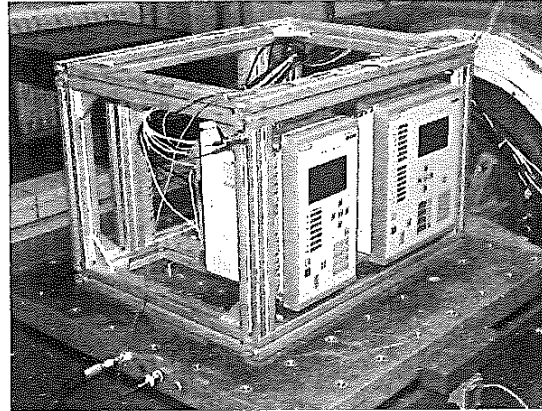


**picture 6**  
Overcurrent Protection 7SJ663 (specimen 7)  
and Overcurrent Protection 7SJ662 (specimen 8)  
on sliding table with acceleration sensors  
*vibration tests in Z-axis*

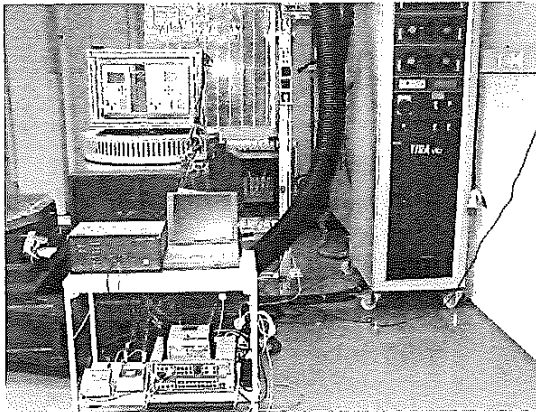
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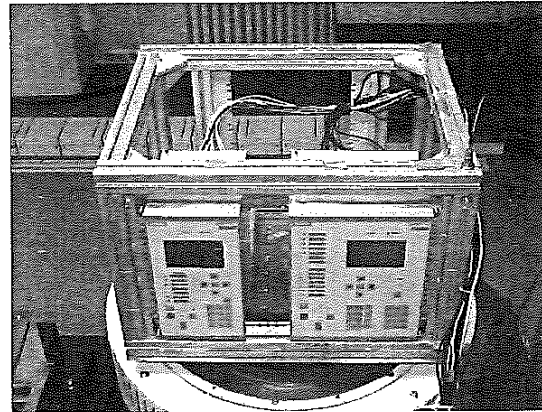
picture 7  
Overcurrent Protection 7SJ663 (specimen 9)  
and Overcurrent Protection 7SJ662 (specimen 10)  
on sliding table with test equipment  
*shock and seismic tests in X-axis*



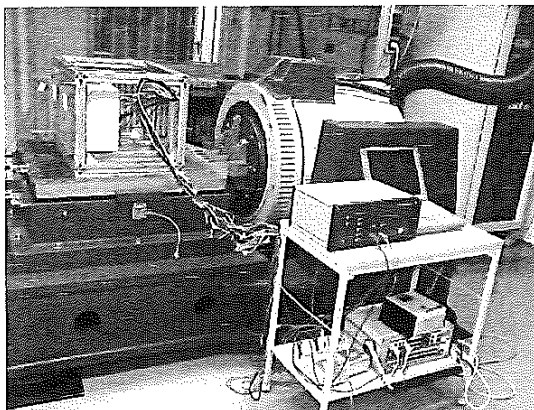
picture 8  
Overcurrent Protection 7SJ663 (specimen 9)  
and Overcurrent Protection 7SJ662 (specimen 10)  
on sliding table with acceleration sensors  
*shock and seismic tests in X-axis*



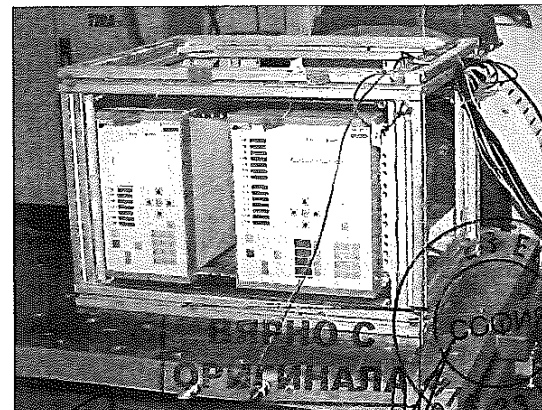
picture 9  
Overcurrent Protection 7SJ663 (specimen 9)  
and Overcurrent Protection 7SJ662 (specimen 10)  
on vibration table with test equipment  
*shock and seismic tests in Y-axis*



picture 10  
Overcurrent Protection 7SJ663 (specimen 9)  
and Overcurrent Protection 7SJ662 (specimen 10)  
on sliding table with acceleration sensors  
*shock and seismic tests in Y-axis*



picture 11  
Overcurrent Protection 7SJ663 (specimen 9)  
and Overcurrent Protection 7SJ662 (specimen 10)  
on sliding table with test equipment  
*shock and seismic tests in Z-axis*



picture 12  
Overcurrent Protection 7SJ663 (specimen 9)  
and Overcurrent Protection 7SJ662 (specimen 10)  
on sliding table with acceleration sensors  
*shock and seismic tests in Z-axis*

000359



Testing laboratory for climatic, mechanical  
and corrosive environmental stress

## CERTIFICATE of QUALITY TEST

Test report No. 10220.05 / 13

<b>Client</b>	<b>Siemens AG</b> <b>IC SG EA PRO D 6 2</b> Wernerwerkdamm 5 13629 Berlin	
<b>Equipment under test</b>	<b>Protection Relay</b> specimen 5	<b>Overcurrent Protection 7SJ663</b> $\frac{1}{2}$ of 19" for panel flush mounting
	<b>Protection Relay</b> specimen 6	<b>Overcurrent Protection 7SJ662</b> $\frac{1}{3}$ of 19" for panel flush mounting
<b>Purpose</b>	<b><i>Test of the climatic and corrosive resistance according to the standards and to the demands of the client.</i></b>	
<b>Test program</b>	<b>Corrosive gas SO<sub>2</sub></b> according to IEC 60068-2-42 <b>Corrosive gas H<sub>2</sub>S</b> according to IEC 60068-2-43 <b>Corrosive gas 4 components</b> according to IEC 60068-2-60	
<b>Test period</b>	12 November 2013 to 21 January 2014	
<b>Realization / results</b>	see page 2 to 4	
<b>Total number of page</b>	14 (inclusive 3 appendixes)	

**Test result**

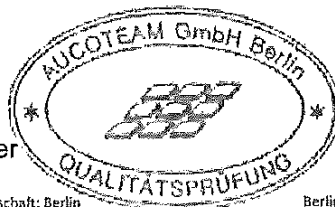
The tests were realized according to the standards and to the demands of the client.

The further evaluation will be done by

На основании чл.36а ал.3 от ЗОП

На основании чл.36а ал.3 от ЗОП

Manager



Test engineer

AUCOTEAM GmbH  
Storkower Str. 115a  
10407 Berlin  
Tel. 030 42188-0  
Fax 030 4232709  
www.aucoteam.de

Gesellschaft: Berlin  
Amtsgericht Berlin Charlottenburg HRB 38393  
USt.-ID-Nr. DE 137 190 620  
Geschäftsführer:  
Dipl.-Ing. Bernd Rhlmeier  
Dipl.-Ing. Werner Zuchhold

Berliner Volksbank eG  
BIC BEVODE33  
IBAN DE56 1009 0070 8301 8410 28  
Commerzbank AG  
BIC DRESDEFF33  
IBAN DE53 1008 0000 0400 4292 00



000360

## 1 Purpose

Test of the corrosive resistance according to the standards and to the demands of the client.

## 2 Equipment under test (EUT)

### Protection Relay

specimen 5  
model  
MLFB  
Firmware  
DIGSI-Software

### Overcurrent Protection 7SJ663

Prototype 025  
 $\frac{1}{2}$  of 19" for panel flush mounting  
7SJ6632-5KB90-3RH7-L0R/BB  
V04.00.03  
V4.88

### Module in Device 7SJ663

1. Display Board with the serial Number 600000 245043
2. Current / Voltage input Board M102/3/6 - 2 with the serial Number 600000 245123
3. Power supply Board PS BO OB – 230 AC with the serial Number CB1311000174
4. BIO Board with the serial Number 600000 208677
5. BIO Board with the serial Number 600000 208676
6. CPU Board with the serial Number 600000 245060
7. ETH Board with the serial Number 600000 238963
8. BIO Board with the serial Number 600000 255772

### Settings in Device 7SJ663

1. Overcurrent  $\geq 10\%$ ; configured to LED 1
2. Overvoltage  $\geq 10\%$ ; configured to LED 2
3. Undervoltage  $\leq 10\%$ ; configured to LED 3
4. Binary Input (BI): BI 1; BI3 – BI13; BI15 – BI25; BI27 – BI36 high active
5. BI2; BI 14; BI 26 low active
6. Binary Output (BO) BO4; BO6; BO7 are supervised

### Protection Relay

specimen 6  
model  
MLFB  
Firmware  
DIGSI-Software

### Overcurrent Protection 7SJ663

Prototype 013  
 $\frac{1}{3}$  of 19" for panel flush mounting  
7SJ6621-5KB90-3HG7-L0D/BB  
V04.00.03  
V4.88

### Module in Device 7SJ662

1. Display Board with the serial Number 600000 254760
2. Current / Voltage input Board M102/3/6 - 2 with the serial Number 000 245116
3. Power Supply Board PS BO OB – 230 AC with the serial Number CB1311000175
4. EXT. BIO Board with the serial Number 600000 255789
5. BI Board with the serial Number 600000 245100
6. CPU Board with the serial Number 600000 245053
7. ETH Board with the serial Number 600000 049730

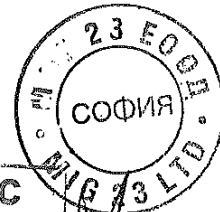
### Settings in Device 7SJ662

1. Overcurrent  $\geq 10\%$ ; configured to LED 1
2. Overvoltage  $\geq 10\%$ ; configured to LED 2
3. Undervoltage  $\leq 10\%$ ; configured to LED 3
4. Binary Input (BI): BI 1; BI3 – BI8; BI10 – BI17; BI19 – BI21 high active
5. BI2; BI9; BI 18 low active
6. Binary Output (BO): BO4; BO6; BO7 are supervised

delivery date of the EUT

11 November 2013

ВЯРНО С  
ОРИГИНАЛА



000361



### 3 Basics

#### 3.1 Demands of the client

#### 3.2 Used standards

- IEC 60068-1:1988 + Corr. 1988 + A1:1992**      **DIN EN 60068-1:1995-03**  
 „Environmental testing - Part 1: General and guidance“
- IEC 60068-2-42:2003**      **DIN EN 60068-2-42:2004-04**  
 „Environmental testing - Part 2-42: Tests - Test Kc:  
 Sulphur dioxide test for contacts and connections“
- IEC 60068-2-43:2003**      **DIN EN 60068-2-43:2004-04**  
 „Environmental testing - Part 2-43: Tests - Test Kd:  
 Hydrogen sulphide test for contacts and connections“
- IEC 60068-2-60:1995**      **DIN EN 60068-2-60:1996-09**  
 „Environmental testing - Part 2-60: Tests - Test Ke:  
 Flowing mixed gas corrosion test“

### 4 Test program

#### 4.1 Corrosive gas, single gas SO<sub>2</sub> – test Kc

according to IEC 60068 -2-42

specimens	not operating
test temperature	(+25 ± 2)°C
relative humidity	(75 ± 5) %
corrosive atmosphere	(25 ± 5) ppm SO <sub>2</sub>
test duration	240:00 h      (10 d)

#### 4.2 Corrosive gas, single gas H<sub>2</sub>S – test Kd

according to IEC 60068 -2-43

specimens	not operating
test temperature	(+25 ± 2)°C
relative humidity	(75 ± 5) %
corrosive atmosphere	(10 ± 5) ppm H <sub>2</sub> S
test duration	240:00 h      (10 d)

#### 4.3 Corrosive gas, mixed gas, 4 components – test Ke

according to IEC 60068 -2-60

specimens	not operating
test temperature	(+25 ± 2)°C
relative humidity	(75 ± 5) %
corrosive atmosphere	0.01 ppm H <sub>2</sub> S 0.20 ppm SO <sub>2</sub> 0.20 ppm NO <sub>2</sub> 0.01 ppm Cl <sub>2</sub>
test duration	240:00 h      (10 d)

### 5 Realization

The environmental tests were carried out one by one according to the program of testing methods (complex 4.1 to 4.3), according to the standards and to the demands of the client. The tests were performed according to the demands of the client as following:

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**МИГ 23 LTD.**

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**5.1 Corrosive gas, single gas SO<sub>2</sub> – test Kc**

This test was realized at the test lab Rail System Testing GmbH (RST).  
 test period 12 November to 22 November 2013  
 realization see appendix 2 - test report No. P50-13-0537\_1-en,  
 Rail System Testing GmbH (RST), 3 December 2013

**5.2 Corrosive gas, single gas H<sub>2</sub>S – test Kd**

This test was realized at the test lab Rail System Testing GmbH (RST).  
 test period 22 November to 2 December 2013  
 realization see appendix 2 - test report No. P50-13-0537\_1-en,  
 Rail System Testing GmbH (RST), 22 October 2013

After the corrosive test, the functionality of the specimens was checked.

**5.3 Corrosive gas, mixed gas, 4 components – test Ke**

This test was realized at the test lab Technologie-Zentrum Oberflächentechnik u. Umweltschutz (TZO) Leipzig GmbH.  
 test period 10 January to 20 January 2014  
 realization see appendix 3 - test report No. 366/13  
 Labor für Umwelterprobung Werkstoffprüfung u. Analytik  
 des Technologie-Zentrum Oberflächentechnik u. Umweltschutz  
 (TZO) Leipzig GmbH, 20 January 2014

After the corrosive test, the functionality of the specimens was checked.

**6 Results**

**6.1 Corrosive gas, single gas SO<sub>2</sub> and H<sub>2</sub>S – test Kc and Kd**

After the corrosive tests of the  
**Protection Relay Overcurrent Protection 7SJ663 (Prototype 020)** and  
**Protection Relay Overcurrent Protection 7SJ662 (Prototype 009)** with  
 - Corrosive gas SO<sub>2</sub> - test Kc  
 (25 ppm SO<sub>2</sub>, 25 °C, 75 % r. h., 10 d not operating)  
 - Corrosive gas H<sub>2</sub>S - test Kd  
 (10 ppm H<sub>2</sub>S, 25 °C, 75 % r. h., 10 d not operating)

the no visible changes was determined at both specimens.  
 After the corrosive test, the functionality of the 2 specimens was ensured.

**6.3 Corrosive gas, mixed gas, 4 components – test Ke**

After the corrosive tests of the  
**Protection Relay Overcurrent Protection 7SJ663 (Prototype 020)** and  
**Protection Relay Overcurrent Protection 7SJ662 (Prototype 009)** with  
 - Corrosive gas 4 components - test Ke  
 (0.01 ppm H<sub>2</sub>S, 0.20 ppm SO<sub>2</sub>, 0.20 ppm NO<sub>2</sub>, 0.01 ppm Cl<sub>2</sub>, 25 °C, 75 % r. h., 10 d not operating)

the no visible changes was determined at both specimens.  
 After the corrosive test, the functionality of the 2 specimens was ensured.

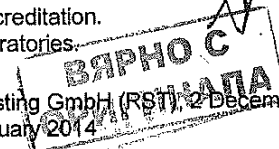
The tests were realized according to the standards  
 and to the demands of the client.

The further evaluation will be done by the client.

The results of the test only refer to the above mentioned equipment under test. The report or individual pages of this testing report may only be copied following the written consent of the testing laboratory. This testing report-No. 10220.05 / 13 includes 4 pages and appendix 1 to 3.

The realized corrosive tests are not included in the scope of accreditation.  
 The realization of these tests was carried out in accredited laboratories.

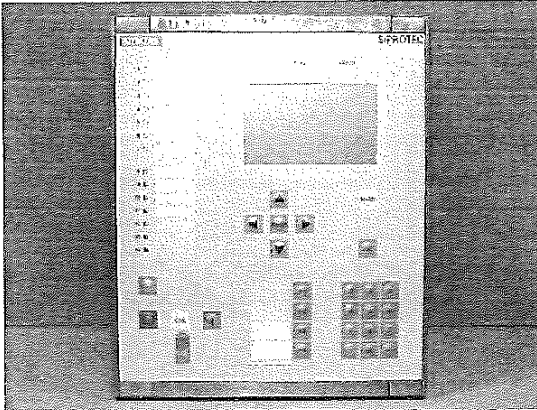
appendix 1 – pictures  
 appendix 2 – test report No. P50-13-0537\_1-en, Rail System Testing GmbH (RST), 2 December 2013  
 appendix 3 – test report No. 366/13, TZO Leipzig GmbH, 20 January 2014



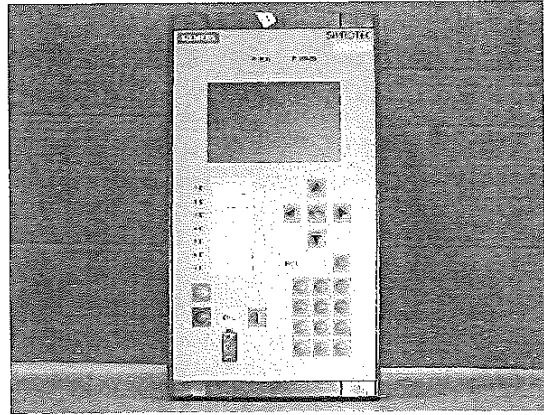
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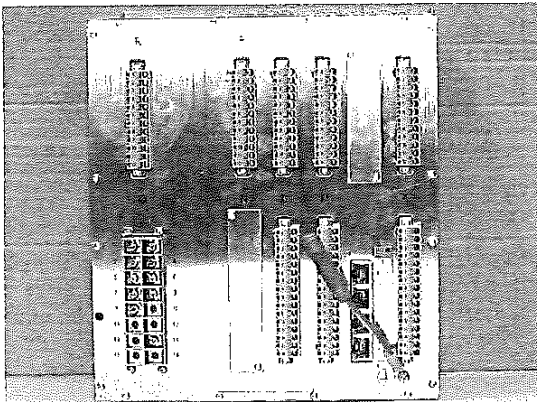
**pictures**



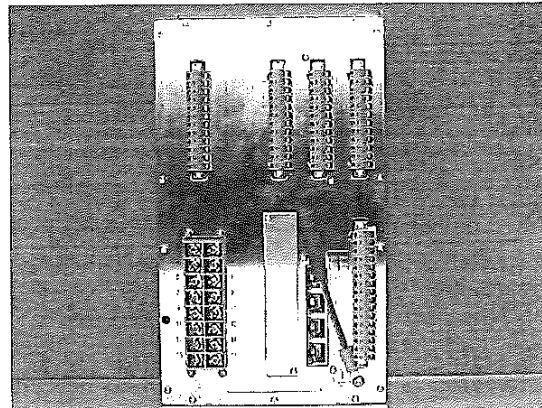
**picture 1**  
Overcurrent Protection 7SJ663 (Prototype 020)  
 $\frac{1}{2}$  of 19" for panel flush mounting  
*before the corrosive tests*



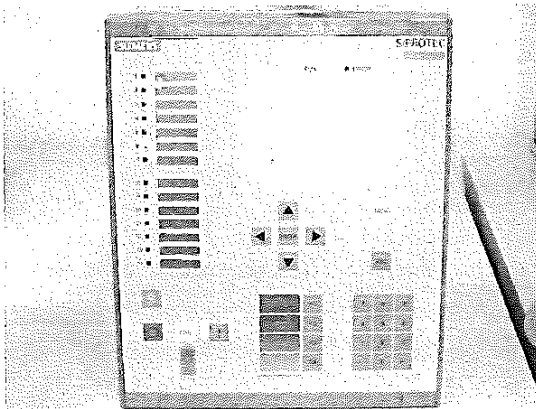
**picture 2**  
Overcurrent Protection 7SJ662 (Prototype 009)  
 $\frac{1}{3}$  of 19" for panel flush mounting  
*before the corrosive tests*



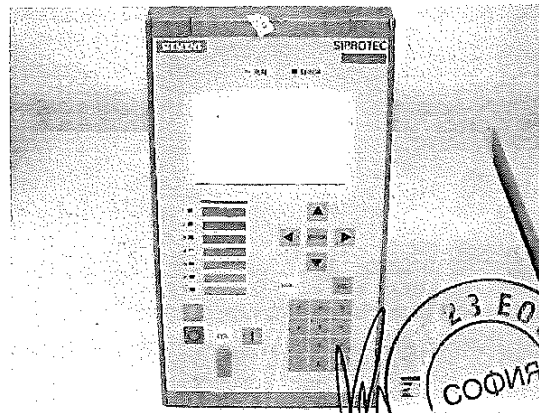
**picture 3**  
Overcurrent Protection 7SJ663 (Prototype 020)  
 $\frac{1}{2}$  of 19" for panel flush mounting  
*before the corrosive tests*



**picture 4**  
Overcurrent Protection 7SJ662 (Prototype 009)  
 $\frac{1}{3}$  of 19" for panel flush mounting  
*before the corrosive tests*



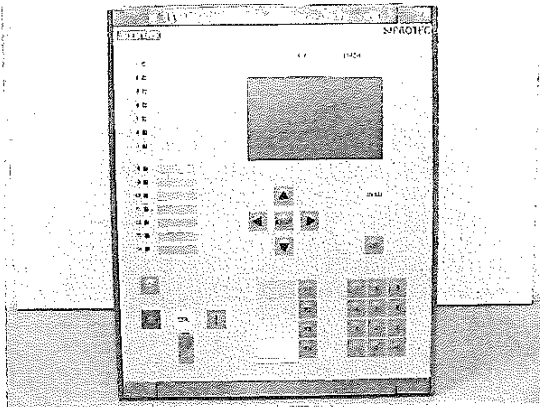
**picture 5**  
Overcurrent Protection 7SJ663 (Prototype 020)  
 $\frac{1}{2}$  of 19" for panel flush mounting  
*functional test before the corrosive tests*



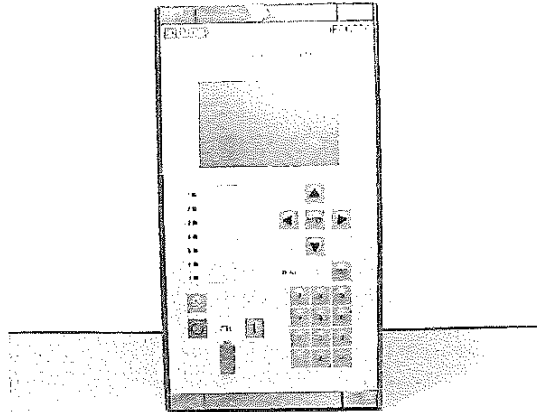
**picture 6**  
Overcurrent Protection 7SJ662 (Prototype 009)  
 $\frac{1}{3}$  of 19" for panel flush mounting  
*functional test before the corrosive tests*

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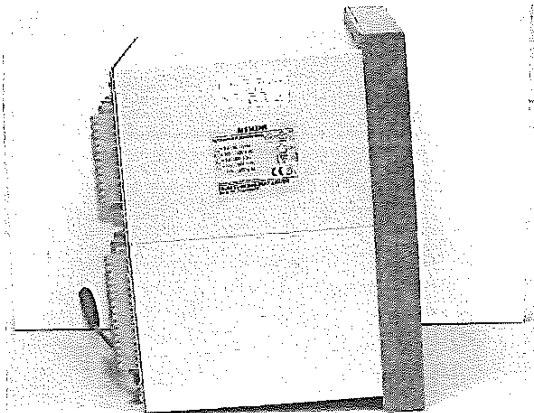
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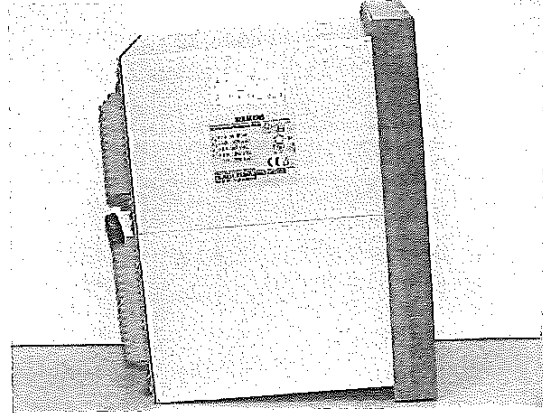
picture 7  
Overcurrent Protection 7SJ663 (Prototype 020)  
no visible changes  
after the corrosive tests Kc and Kd



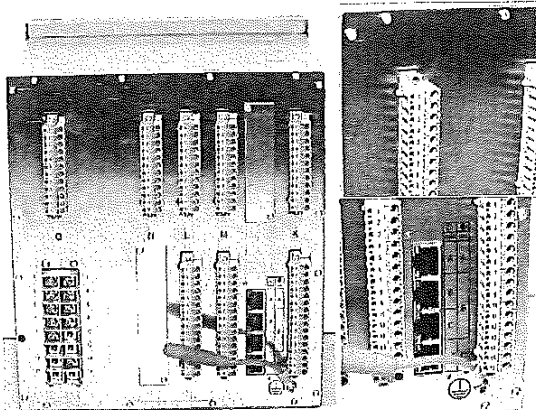
picture 8  
Overcurrent Protection 7SJ662 (Prototype 009)  
no visible changes  
after the corrosive tests Kc and Kd



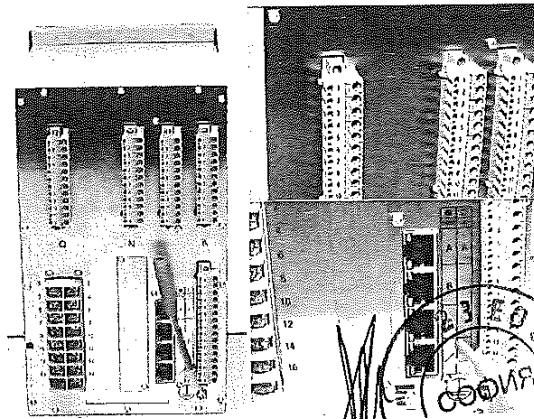
picture 9  
Overcurrent Protection 7SJ663 (Prototype 020)  
no visible changes  
after the corrosive tests Kc and Kd



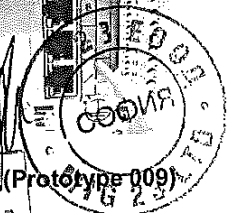
picture 10  
Overcurrent Protection 7SJ662 (Prototype 009)  
no visible changes  
after the corrosive tests Kc and Kd



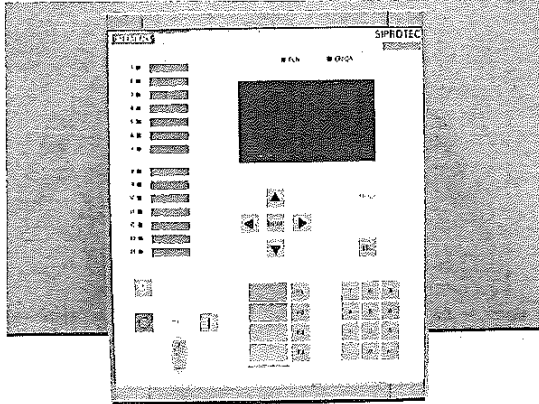
picture 11  
Overcurrent Protection 7SJ663 (Prototype 020)  
no visible changes  
after the corrosive tests Kc and Kd



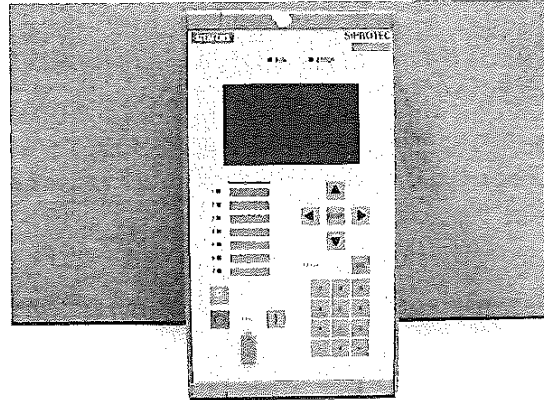
picture 12  
Overcurrent Protection 7SJ662 (Prototype 009)  
no visible changes  
after the corrosive tests Kc and Kd



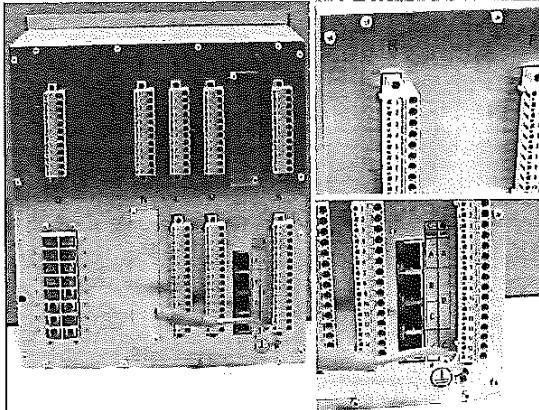
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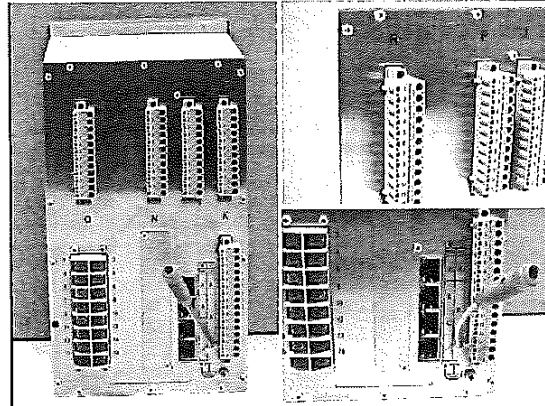
picture 13  
Overcurrent Protection 7SJ663 (Prototype 020)  
no visible changes  
after the corrosive test Ke (mixed gas)



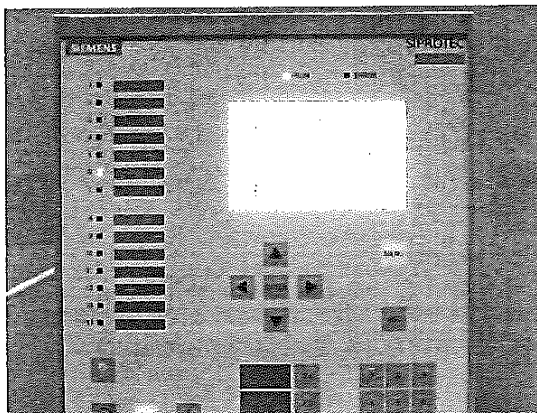
picture 14  
Overcurrent Protection 7SJ662 (Prototype 009)  
no visible changes  
after the corrosive test Ke (mixed gas)



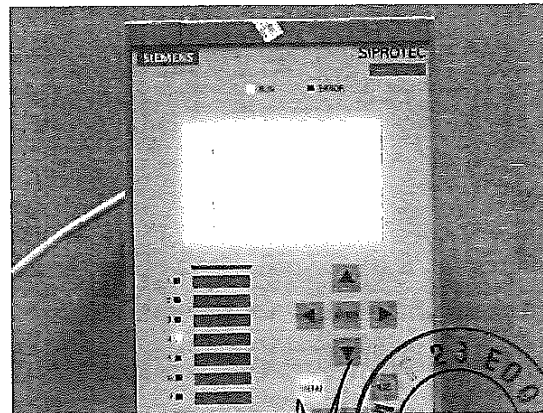
picture 15  
Overcurrent Protection 7SJ663 (Prototype 020)  
no visible changes  
after the corrosive test Ke (mixed gas)



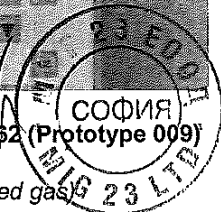
picture 16  
Overcurrent Protection 7SJ662 (Prototype 009)  
no visible changes  
after the corrosive test Ke (mixed gas)



picture 17  
Overcurrent Protection 7SJ663 (Prototype 020)  
functionality was ensured  
after the corrosive test Ke (mixed gas)



picture 18  
Overcurrent Protection 7SJ662 (Prototype 009)  
functionality was ensured  
after the corrosive test Ke (mixed gas)



ОРИГИНАЛ

000366



TESTING THE WORLD  
FOR TOMORROW

Customer:

Aucoteam GmbH  
Prüflabor – GB P  
Mr. Geburtig  
Storkower Straße 115 a  
10407 Berlin

- Environmental Lab
- Materials Lab
- Fire Lab
- New Technologies

RST Rail System Testing GmbH  
Philipp-Pfarr-Straße 10  
16761 Hennigsdorf  
  
Fon +49 (0)3302 49982 0  
Fax +49 (0)3302 49982 15  
  
www.rst-labs.de  
info@rst-labs.de

**Test Report No. P50-13-0537\_1-en**

**Environmental Tests**

Order No.: 50-13-0537  
Date: 03/12/2013  
Test engineer: Mrs. Förster  
Documentation: fr

This report includes  
3 pages.

phone: 03302 49982 54

**Delivery date specimen:** 12/11/ 2013

**Test date:** 12/11/2013 until 02/12/2013

**Specimen:** 2 pieces protection devices (specimen No. 50-13-0537-5 and 6)  
(for details see page 2)

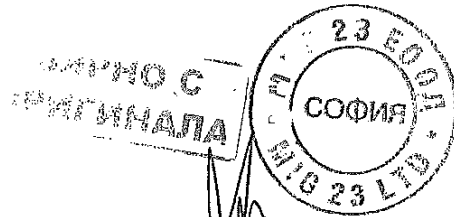
**Relevant specification:**

- Test Kd; Hydrogen sulphide test for contacts and connections based of DIN EN 60068-2-43 (edition 04/2004)
- Test Kc; Sulphur dioxide test for contacts and connections according to DIN EN 60068-2-42 (edition 04/2004)
- Visual inspection  
(for details see page 2)

**Objective:** Proof of the stability of the protection devices at the conditions mentioned in the relevant specification.

**Results:** The protection devices were tested according to the relevant specification.  
No visible changes and no visible corrosion effects of the specimens were detected after the exposures in comparison to the initial states (for details see page 3).

**Bernd Sommerfeld**  
Head of the Environmental Lab



The results refer only to the specimens above mentioned.  
This Test Report must always be copied entirely. Any copying of extracts and publication require the prior consent of the Laboratory.

Manager Dipl.-Ing. G. Schmidt	Landesbank Berlin Konto 133 80 800 BLZ 100 500 00	BIC: BE LA DE BE IBAN: DE44 1005 0000 0013 3808 00	Amtsgericht Neuruppin HRB 6580 OPR USt-Id. DE B13 68 62 94
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*Handwritten signatures and the number 000367*



## 1 Specimen

2 pieces protection devices

specimen No. 50-13-0300-..	version/type
5	7SJ6632-5KB90-3RH7-L0R/BB
6	7SJ6621-5KB90-3HG7-L0D/BB

## 2 Relevant Specification

### 2.1 Exposures (sequence of tests)

#### 2.1.1 Test Kd; Hydrogen sulphide test for contacts and connections according to DIN EN 60068-2-43 (edition 04/2004)

concentration H<sub>2</sub>S: (10 ... 15) ppm  
 exposure temperature: (25 ± 2) °C  
 relative humidity: (75 ± 5) %  
 test duration: 10 days

#### 2.1.2 Test Kc; Sulphur dioxide test for contacts and connections according to DIN EN 60068-2-42 (edition 04/2004)

concentration SO<sub>2</sub>: (25 ± 5) ppm  
 exposure temperature: (25 ± 2) °C  
 relative humidity: (75 ± 5) %  
 test duration: 10 days

## 2.2 Evaluations

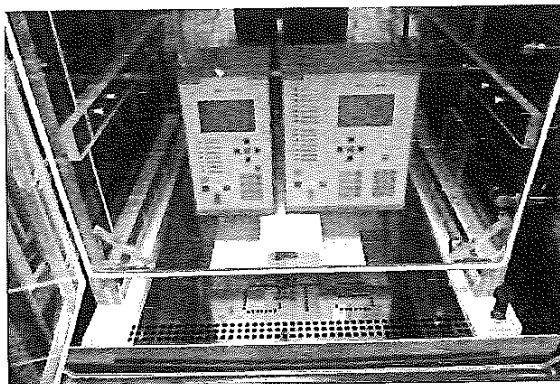
### 2.2.1 Visual inspection

Examination of the changes in relation to the initial states of the specimens  
 inspection times: after each exposure

## 3 Test procedure

### 3.1 Test setup

The test setup of the noxious gas tests is shown in the following figure 1.

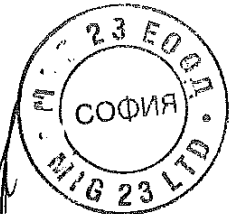


RST/9E5WQ89D\_F00003441

fig. 1

test setup:  
specimen in the test chamber

ВЯРНО С  
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Deutsche  
Akkreditierungsstelle  
D-PL 13012-01-00

Manager  
Dipl.-Ing. G. Schmidt

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0000 0013 3000 00

Amtsgericht Neuruppin  
HRG 6580 OPR  
USt-Id. DE-813 68 62 94

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### 3.2 Exposure diagram

The stress sequences of the noxious gas tests are shown in the following diagram 1:

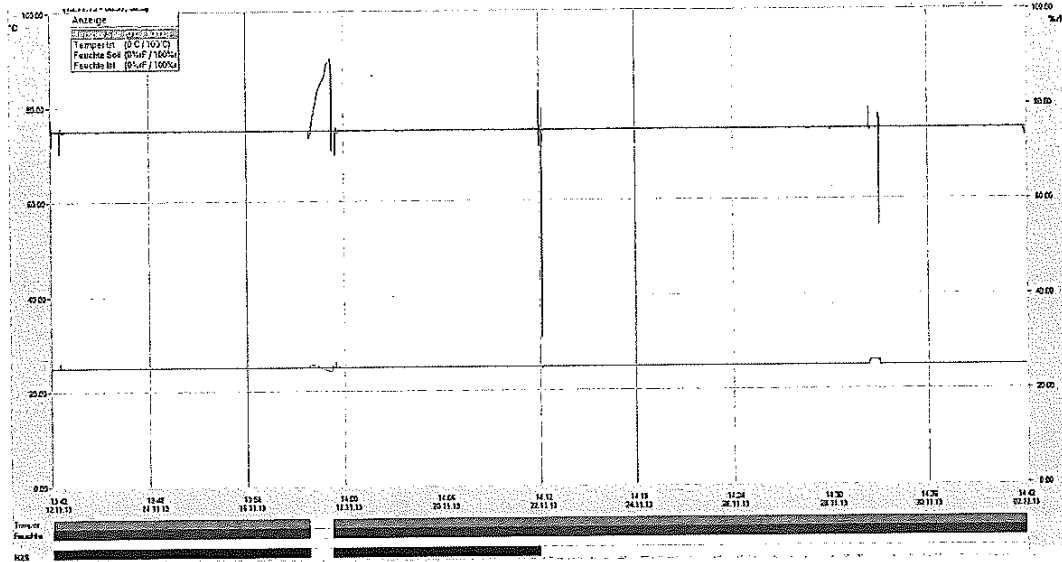


Diagram 1: Loading by Test Kc: Sulphur dioxide and test Kd: Hydrogen sulphide  
remark: failure of the test chamber on 17 November 2013

### 3.3 Test equipment

The test and measuring instruments as well as the calibration status were checked before using.

Test equipment	Inv. No.
Noxious gas test chamber type C+10/600-SG (CTS-SG 2), manufacturer CTS	7993 0771

## 4 Results

### 4.1 Visual inspection

No visible changes, no visible corrosion effects of the specimens were detected after the exposures in comparison to the initial states:

– before the exposures

specimen No. 50-13-0537-5:

back cover sheet (delivery status): some fingerprints

specimen No. 50-13-0537-6:

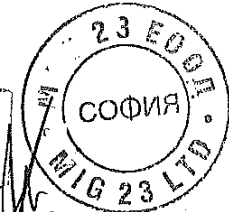
without findings

– after the exposures

specimen No. 50-13-0537-5 and -6:

no visible changes, no visible corrosion effects

ВЕРНО С  
ОРИГИНАЛА



Manager  
Dipl.-Ing. G. Schmidt

Landesbank Berlin  
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Amtegericht Neuruppin  
HRB 6580 OPR  
USt-Id. DE 813 60 62 94

000369



## TEST REPORT

**No. 366/13**

**Client** AUCOTEAM GmbH  
Test laboratory / GB P  
Mr. Geburtig  
Storkower Straße 115 a  
D-10407 Berlin

**Date of order** 2013-12-04 test order no. 95.13.0944.1

**Date of receiving the specimens** 2013-12-05

**Period of testing** 2014-01-10 to 2014-01-20

### 1 TEST OBJECT

#### 1.1 Designation / Number of pieces

Safety device SIPROTEC with coated printed boards / 2 pieces  
labelled with 7SJ662 and 7SJ663

1.2 **Producer** Siemens AG

### 2 TASK

Testing to determine the resistance against flowing mixed gas in accordance with  
DIN EN 60068-2-60 : 1996-09, Test Ke, Method 4

### 3 TEST PROGRAMME

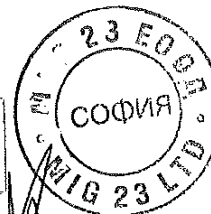
#### 3.1 Initial examinations

3.1.1 Test of function

*carried out by the client*

3.1.2 Visual inspection

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page 1 of 2 pages

000370

**3.2 Loading by flowing mixed gas in accordance with DIN EN 60068-2-60, Test Ke, Method 4**

Test device Corrosion test chamber K 750 TZO Leipzig GmbH  
Measurement of the gas concentration by Zellweger analytics TOX GAS MONITOR 7100

Concentration of Hydrogen sulphide (H <sub>2</sub> S)	0,01 cm <sup>3</sup> / m <sup>3</sup> (ppm)	( 10 ± 5) ppb
Concentration of Nitrogen dioxide (NO <sub>2</sub> )	0,2 cm <sup>3</sup> / m <sup>3</sup> (ppm)	(200 ± 20) ppb
Concentration of Chlorine (Cl <sub>2</sub> )	0,01 cm <sup>3</sup> / m <sup>3</sup> (ppm)	( 10 ± 5) ppb
Concentration of Sulphur dioxide (SO <sub>2</sub> )	0,2 cm <sup>3</sup> / m <sup>3</sup> (ppm)	(200 ± 20) ppb

Temperature (25 ± 1) °C  
Relative Humidity (75 ± 3) %

Test duration 10 d

Exposition *see annex, figure 1*

**3.3 Final examinations** *carried out by the client*

**4 RESULTS**

**4.1 Initial examinations**

4.1.1 Test of function *see the record written by the client*

4.1.2 Visual inspection

Damages or defects are not visible.

4.2 Final examinations *see the record written by the client*

Leipzig, 2014-01-20

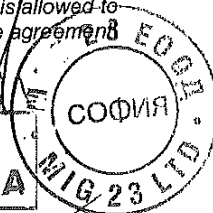
Laboratory for Environmental  
Testing and Material Testing

Annex sheet 1 and 2

Dr.-Ing. Frank Erler  
Laboratory Manager

*The test result is true only for the specimen(s) mentioned in the clause „test object (specimen)“. It is allowed to copy the complete test report only. When the test report shall be copied in the form of extracts the agreement must be given by the test laboratory for them.*

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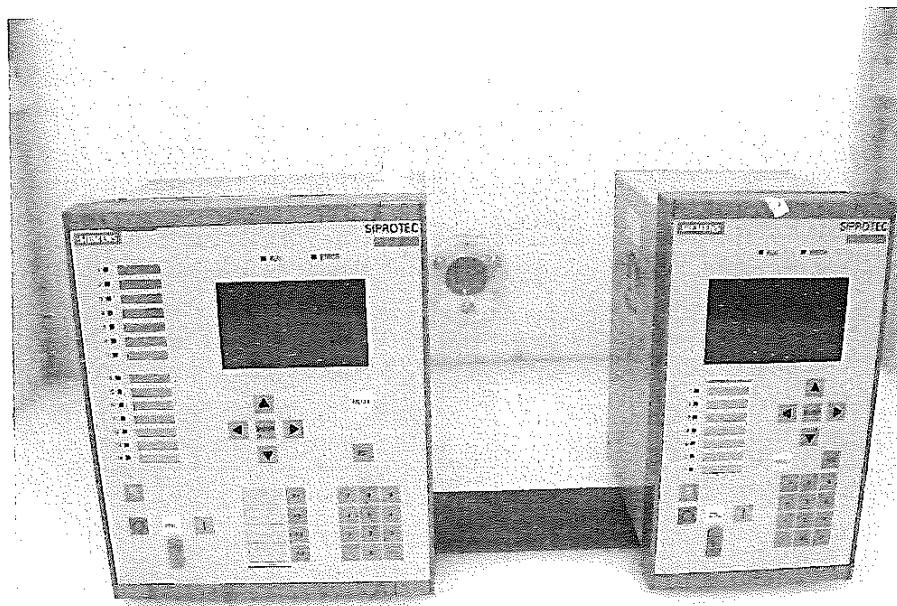
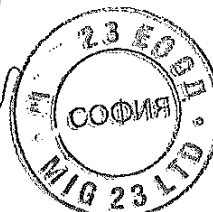


Figure 1 Exposition in the test chamber

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A large, stylized handwritten signature in the bottom center of the page.

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000372

Schadgasanalytik mit dem Zellweger analytics TOX GAS MONITOR 7100

Measurement of the gas concentration by Zellweger analytics TOX GAS MONITOR 7100

\*\*\*\*\*  
TZO GMBH  
LEIPZIG  
SERIES 7100 SN-5394  
\*\*\*\*\*  
OPTICS  
CALIBRATION

PERFORMED  
ON AT  
01/10/14 09:00:30  
  
NEW @ IS 1.020  
  
OLD @ WAS 1.015  
  
CARD SPAN - 1718  
CARD ZERO - 600  
ACTUAL SPAN- 2173  
ACTUAL ZERO- 1077

10.07.14 No.

Stickstoffdioxid // Nitrogen dioxide

10.07.14 No.

11:30	204	PPB	NO2/L
11:27	202	PPB	NO2/L
11:25	204	PPB	NO2/L
11:23	202	PPB	NO2/L
11:21	205	PPB	NO2/L
11:18	205	PPB	NO2/L
11:16	208	PPB	NO2/L
11:14	200	PPB	NO2/L
11:12	202	PPB	NO2/L
11:09	209	PPB	NO2/L
11:07	202	PPB	NO2/L
11:05	203	PPB	NO2/L
11:03	205	PPB	NO2/L
11:00	200	PPB	NO2/L

Chlor // Chlorine

10.07.14 No.

10:07	10	PPB	CL2/L
09:57	11	PPB	CL2/L
09:46	10	PPB	CL2/L
09:36	10	PPB	CL2/L
09:26	10	PPB	CL2/L

Schwefeldioxid // Sulphur dioxide

10.07.14 No.

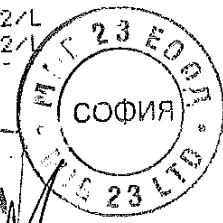
14:02	206	PPB	SO2/L
13:59	207	PPB	SO2/L
13:57	202	PPB	SO2/L
13:54	205	PPB	SO2/L
13:52	205	PPB	SO2/L
13:49	207	PPB	SO2/L
13:47	202	PPB	SO2/L
13:44	202	PPB	SO2/L
13:42	205	PPB	SO2/L
13:39	207	PPB	SO2/L
13:36	203	PPB	SO2/L
13:34	200	PPB	SO2/L
13:31	205	PPB	SO2/L

Schwefelwasserstoff // Hydrogen sulphide

10.07.14 No.

12:45	10	PPB	H2S/L
12:35	10	PPB	H2S/L
12:25	10	PPB	H2S/L
12:15	10	PPB	H2S/L
12:05	10	PPB	H2S/L

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# ДОКУМЕНТ 7.2

С

В



## ДЕКЛАРАЦИЯ

че предложеното оборудване в процедурата отговаря на минималните технически изисквания на Възложителя, посочени в таблица 7

Долуподписаният Антон Иванов Илиев, в качеството ми на представляващ „МИГ 23“ ЕООД, участник в процедура за изпълнение на обществена поръчка с реф. № РРД 19-103 и предмет: „ Модернизация (ретрофит /проектиране, реконструкция, доставка и монтаж на машини и съоръжения, подготовка и въвеждане в експлоатация/) на възлови разпределителни станции 20 (10) kV и изграждане на вериги на телемеханика в регион „Ловеч - Враца“, регион „Монтана – Видин“ и регион „Плевен“

## ДЕКЛАРИРАМ, ЧЕ :

че предложеното от нас оборудване в процедурата, отговаря на минималните технически изисквания на **СТАНДАРТ НА МАТЕРИАЛА ЗА ПОСОЧНА ЦИФРОВА ЗАЩИТА ЗА ВЪЗДУШНИ И КАБЕЛНИ ЕЛЕКТРОПРОВОДНИ ЛИНИИ СР. Н.**, посочени в таблица 7, както следва:

### Характеристики на работната среда:

№	Характеристика	Стойност
1.	Място на монтиране	На закрито
2.	Максимална температура на околната среда	До + 55°C
3.	Минимална температура на околната среда	Минус 20°C
4.	Надморска височина	До 1000 m
5.	Относителна влажност	До 90% при 20°C

### Параметри на електрическата разпределителна мрежа:

№	Параметър	Стойност	
1.	Номинални напрежения	10 000 V	20 000 V
2.	Максимални работни напрежения	12 000 V	24 000 V
3.	Номинална честота	50 Hz	
4.	Брой на фазите	3	
5.	Заземяване на звездния център	През активно съпротивление	

Общи технически параметри, характеристики и др. данни за посочна цифрова защита за въздушни и кабелни електропроводни линии Ср.Н., за които Участникът декларира, че предложеното от него оборудване отговаря на посочените минимални технически изисквания на Възложителя, посочени в таблицата по-долу:

№	Параметър/характеристика	Минимални технически изисквания
1.	Защити и автоматика:	
-	Трифазна двустъпална максималнотокова защита с независими от тока характеристики	Да
-	Трифазна едностъпална бързодействаща токова отсечка с независими от тока характеристики	Да
-	Трифазна двустъпална токова земна защита с независими от тока характеристики	Да
-	Автоматично повторно включване (АПВ)	Да

000374

№	Параметър/характеристика	Минимални технически изисквания
-	За земна защита, резултатния земен ток да се изчислява от ЦЗ, като в съответния ѝ токов вход може да бъде присъединен както токов трансформатор тип „ФЕРАНТИ“, така и филтър за токове с нулева последователност, изпълнен чрез три фазни токови трансформатори. Начинът на присъединяването на ЦЗ за отчитане на токовете на земно съединение да се определя индивидуално за всеки конкретен случай.	Да
-	Всяка една от защитните функции, които са интегрирани в една защита да е с възможност за извеждане от действие, независимо от другите.	Да
-	ЦЗ да има възможност за създаване и поддържане на минимум два набора от настройки и конфигурации, които могат да се избират дистанционно или от мястото на експлоатация.	Да
-	Защитите да следят и сигнализират за възникване на несиметричен режим.	Да
-	Всички защиты трябва да притежават свободно програмируеми цифрови входове, изходи и светодиодна индикация, както и възможност за задаване на продължителността на импулса за изключване за всеки цифров изход по отделно.	Да
-	Да е осигурена аварийна сигнализация при неизпълнена команда, подаване на неразрешени команди и други.	Да
-	ЦЗ трябва да имат 2 нива на достъп, реализирани с пароли и да позволяват: - потребителска настройка на комуникацията от място(от лицев панел) или дистанционно(от лицев панел, с преносим компютър и дистанционно). - потребителска настройка на защитните функции, конфигуриране и тестване от място (от лицев панел, с преносим компютър и дистанционно).	Да
-	При отпадане на захранването да се запазват въведените настройки, конфигурации, аварийната и архивната информация.	Да
-	Контрол на броя и вида на изключванията на прекъсвачите.	Да
-	Всеки запис в регистъра на аварийна информация, да съдържа астрономическо време и пълни данни, характеризиращи събитието. Регистраторът на аварийна информация да осигурява и осцилографна информация с история и предистория за зададен времеви интервал за регистрирано събитие.	Да
-	Всички защиты трябва да притежават вграден LCD/LED-дисплей за визуализиране на текущо измерваните ефективни стойности (модул и фаза) на всеки от аналоговите входове на устройството и аварийната информация.	Да
-	Всяка защита да притежава стандартен интерфейс за комуникация по Ethernet, RS-485, стандартен интерфейс за комуникация с персонален компютър, необходим при осъществяване на функции по настройка, конфигуриране и изчитане на регистрирана от защитата информация и съответно програмно осигуряване.	Да
-	Комуникационния интерфейс за връзка с RTU да се счита като неразделна част от ЦЗ. Комуникационния интерфейс да има светодиодна индикация за режима на работа.	Да
-	ЦЗ трябва да включва система за самоконтрол и самодиагностика, включително и на комуникациите с вътрешни и външни потребители.	Да
-	Да се осигури възможност за шунтиране на токовите вериги и присъединяване на външна измервателна техника на изградените клемореди.	Да

000375

№	Параметър/характеристика	Минимални технически изисквания
2.	Номинално оперативно напрежение	от 24 до 220 V DC $\pm$ 20 % и 220 V AC $\pm$ 20 %
3.	Буфер на захранването	$\leq$ 50 ms
4.	Консумация на защитата при I <sub>n</sub>	$\leq$ 0.3 VA
5.	Номинален ток, I <sub>n</sub>	5 A
6.	Клеми на токови и оперативни вериги	Винтови клеми позволяващи присъединяване на медни проводници, клас 1, със сечение между 1,5 mm <sup>2</sup> и 4 mm <sup>2</sup> (Степен на защита: min IP20).
7.	<b>Лицев панел:</b>	
-	Наличие на LCD/LED дисплей и светодиодна индикация на лицеви панел за мнемосхема, заработване, изключване, неизправност на защитата и др. (Дисплеят трябва да бъде ясно четим при всички възможни условия на осветление в помещението, дори при пълен мрак).	Да
-	Брой на светодиодните индикатори с възможност за мигаща индикация и наличие на два цвята при промяна на състоянието, зелен-червен (програмируеми).	$\geq$ 8
-	Заводски програмирани светодиоди за състоянието на ЦЗ.	$\geq$ 2
-	Визуализиране на дисплея на параметрите за настройка и на текущите и архивирани данни от работата на защитата.	Да
-	Наличие на клавиатура за визуализиране на информация от работата на устройството, за настройка и конфигуриране и за управление на прекъсвача.	Да
-	Степен на защита на лицев панел	$\geq$ IP 54
8.	<b>Комуникации:</b>	
-	Наличие на стандартен интерфейс и протокол съгласно <b>MODBUS TCP/IP</b> и <b>IEC 61850</b> или еквиваленти за оптична или жична връзка с локална мрежа за предаване на информация от дневника на събития и от аварийния регистратор и за управление на силовото комутиращо устройство.	БДС EN 61850, MODBUS TCP/IP или еквиваленти
-	Достъп от РС и от собствената клавиатура до промяна на настройките и на вградените защитни и комуникационни функции.	Да
-	Достъп от РС и от собствената клавиатура до промяна на конфигурацията.	Да
-	Наличие на стандартен интерфейс на лицеви панел за връзка с преносим компютър.	Да
-	Наличие на сменяема парола за различните нива на достъп до данните за настройките на: - комуникационни функции на ЦЗ; - защитни функции на ЦЗ.	Да
-	Буферирание на информацията при повреда в комуникациите.	Да
9.	<b>Регистратори:</b>	
-	Наличие на функция "регистратор на събития" (fault recorder).	Да
-	Точност на записа при регистриране на събития.	$\geq$ 1 ms
-	Брой и съдържание на регистрираните събития - вид работилата защита, вид на късото съединение, дата/време.	$\geq$ 10
-	Наличие на функция „аварийен регистратор“ (disturbance recorder).	Да
-	Скорост на сканиране.	$\geq$ 1000 Hz
-	Обем на буфера за регистриране на аварийни събития.	$\geq$ 15 s

*См*

*[Signature]*

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000376



№	Параметър/характеристика	Минимални технически изисквания
10.	Софтуер	<p>а) Софтуерът за параметризация да е последна версия и с min 20 (двайсет) безплатни лицензии). В потребителската си част, да е напълно документиран и така структуриран, че да може да се променят и добавят бързо нови функции.</p>
		<p>б) Надграждането (upgrade) и обновяването (update) на софтуерът (firmware) на ЦЗ се предоставя на възложителя безплатно за срока на експлоатация на ЦЗ.</p>
		<p>в) ЦЗ трябва да позволяват тестване и обслужване на отделни локални устройства без да се повлиява работата на останалите. Изпитването на двоичните входове и изходи не трябва да предизвиква загуба или промяна на данни от входа или към изхода, който се тества. ЦЗ при тези проби не трябва да стартира или рестартира своята вътрешна логика, нито да се отрази на данните, които са архивирани в нея.</p>
		<p>г) Софтуерът на ЦЗ трябва да изпълнява основно следните функции:</p> <ul style="list-style-type: none"> <li>• управление и блокировки на команди към високоволтовото оборудване тип на защитата;</li> <li>• сигнализиране и архивиране на състоянието на високоволтовото оборудване;</li> <li>• измерване на аналогови величини от измервателните трансформатори към съответните присъединения;</li> <li>• изчисляване на аналогови величини;</li> <li>• архивиране, обработка и визуализиране на данни от аварийните регистратори;</li> <li>• настройка и конфигуриране на всяка защитна функция;</li> <li>• настройка и конфигуриране на комуникационния интерфейс;</li> <li>• съхраняване на събития и измерени аналогови стойности;</li> <li>• поддържане на база данни, възможност за конфигуриране и за потребителско дефиниране на различни видове справки;</li> <li>• самотестване и самодиагностика на ЦЗ;</li> <li>• моделиране и симулация;</li> </ul>

00037

№	Параметър/характеристика	Минимални технически изисквания
11.	Монтаж	<p>а) ЦЗ трябва да са изградени като система за вграждане в 19" рамка на шкаф и да притежават пълна независимост от външни електромагнитни влияния.</p> <p>б) При конкретна заявка да е възможен следния монтаж: преден монтаж тип Panel surface и заден монтаж тип Flush/Rack Mounted.</p> <p>в) Всички операции трябва да се извършват от лицевата част, като не трябва да е необходим достъп отстрани.</p>
12.	Маркировка	<p>Маркировката трябва да бъде надеждно и трайно нанесена. Типът, номиналните данни, сериен номер, хардуерна и софтуерна версия на ЦЗ трябва да бъдат маркирани в буквено-цифров вид. Всички клемореди, клеми, платки, слотове и т.н. трябва да бъдат ясно маркирани. Обикновени самозалепващи стикери не са допустими.</p>
13.	Опаковка	<p>а) Подходяща опаковка предпазваща от механични повреди и атмосферни влияния при транспорт и съхранение.</p> <p>б) Върху опаковката трябва да има етикет, съдържащ следната информация:</p> <ul style="list-style-type: none"> <li>• наименованието и/или логото на производителя;</li> <li>• тип на защитата;</li> <li>• сериен номер;</li> <li>• дата на производство;</li> <li>• страна на производство;</li> <li>• общо тегло, kg.</li> </ul>
14.	Окомплектовка	<p>- Лицензиран потребителски софтуер, с min 5 безплатни лицензии) и кабел за връзка на защитата със преносим компютър(или друго техническо решение), както и други аксесоари в зависимост от указанията на производителя.</p> <p>- Списък на адресите, съгласно т.б.5 от таблица 6</p>
15.	Проектна експлоатационна дълготрайност, год.	≥ 20 години

000378

Технически данни за посочна цифрова защита за въздушни и кабелни електропроводни линии Ср.Н., за които Участникът декларира, че предложеното от него оборудване отговаря на посочените минимални технически изисквания на Възложителя, посочени в таблицата по-долу:

№	Технически параметър	Минимални технически изисквания
1.	Двоични изходи:	
-	Номинално работно напрежение на изходните контакти	от 24 до 220 V DC $\pm$ 20% и 220 V AC $\pm$ 20 %
-	Допустим ток при отваряне на контактите при L/R<40ms (при 220V AC)	$\geq$ 0.1 A
-	Траен допустим ток през затворен контакт (при 220V AC)	$\geq$ 5 A
-	Краткотраен допустим ток през затворен контакт (при 220V AC)	$\geq$ 30 A за 4 s
-	Брой програмируеми изходи	$\geq$ 7
2.	Аналогови входове:	
2.1	Токови входове	-
-	Брой токови входове – Ia, Ib, Ic, 3Io	4
-	Номинален ток	5 A
-	Термично претоварване в токовите вериги:	-
-	• Трайно	4 In постоянно
-	• 3a 30 s	30 In
-	• 3a 1 s	100 In
-	Динамично претоварване за 1/2 T	250 In
2.2	Напреженови входове	-
-	Брой напреженови входове – Ua, Ub, Uc, 3Uo	4
-	Номинално фазно напрежение	100/ $\sqrt{3}$ V
-	Допустимо продължително претоварване	2 Un
-	Измервани и изчислени величини:	-
-	-Фазови токове и 3Io	4
-	-Фазови напрежения и напрежение 3Uo	4
-	-Линейни напрежения	3
-	-Активна мощност и енергия с посока	Да
-	-Реактивна мощност и енергия с посока	Да
-	-Пълна мощност и енергия	Да
-	-Cos $\phi$ - капацитивен, индуктивен	Да
-	-Честота	Да
-	Грешка при измерване на ефективните стойности на I в диапазона от 0.1-1.2 In в % от измерената стойност	$\geq$ 1
-	Грешка при измерване на ефективните стойности на U в диапазона от 0.8-1.2 Un в % от измерената стойност	$\geq$ 1
-	Грешка при изчисление на P, Q, S в диапазона 0.1-1 In и 0.8-1.2 Un в % от измерената стойност	$\geq$ 1
-	Грешка при измерване на енергия	$\geq$ 1
3.	Двоични входове:	
-	Номинално захранващо напрежение	от 24 до 220 V DC $\pm$ 20 % и 220 V AC $\pm$ 20 %
-	Брой програмируеми входове	$\geq$ 12
4.	Функционални изисквания:	
-	Трифазна максималнотокова защита (MT3) с независимо от тока закъснение	Да
-	Наличие на две стъпала по ток и по време	Да
-	Бързодействие на защитата с включено време на цифровия изход	$\leq$ 35 ms
-	Трифазна токова защита (TO) с независимо от тока закъснение	Да
-	Наличие на две стъпала по ток и по време	Да

-	Бързодействие на защитата с включено време на цифровия изход	≤ 35 ms
-	Токова земна защита (ТЗЗ), с независимо от тока забавяне, за мрежа средно напрежение, заземена през активно съпротивление	Да
-	Наличие на четири стъпала по ток и по време	Да
-	Бързодействие на защитата с включено време на цифровия изход	≤ 35 ms
-	Inrush функция по втори хармоник блокировка по II хармоник	Да
4.1	Настройка на времерелетата за МТЗ:	-
-	Диапазон на настройка по ток към съответните стъпала	0,1+25 In стъпка 0,01 или ∞
-	Диапазон на настройка на времерелетата към съответните стъпала	0,00+60,00 s със стъпка 0,01
4.2	Настройка на времерелетата за ТО:	-
-	Диапазон на настройка по ток към съответните стъпала	0,1+12,5 In стъпка 0,01 или ∞
4.3	Настройка на времерелетата за ТЗЗ:	-
-	Диапазон на настройка по ток към съответните стъпала	0,05+25 In стъпка 0,01 или ∞
-	Диапазон на настройка на времерелетата към съответните стъпала	0,00+60,00 s със стъпка 0,01
5.	Трифазно АПВ	Да
-	Кратност на АПВ	≥ 3
-	Пускане на АПВ - от вътрешна РЗ или от несъответствие	Да
-	Блокиране на АПВ от външни контакти и от вътрешни логически променливи (задействане на ТО) и др.	Да
-	Наличие на вграден часовник (астрономично време) Д/М/Г час:мин:сек:милисек и възможност за синхронизация.	Да
-	Възможност за дефиниране на повече от един комплект настройки на ЦЗ.	Да

На основание чл.36а ал.3 от  
ЗОП

Дата 31.10.2019 г.

Декларатор:

000380

# ДОКУМЕНТ 8

5

13

14

## ДЕКЛАРАЦИЯ

че предложеното оборудване в процедурата отговаря на минималните технически изисквания на Възложителя, посочени в таблица 8

Долуподписаният Антон Иванов Илиев, в качеството ми на представляващ „МИГ 23“ ЕООД, участник в процедура за изпълнение на обществена поръчка с реф. № PPD 19-103 и предмет: „Модернизация (ретрофит /проектиране, реконструкция, доставка и монтаж на машини и съоръжения, подготовка и въвеждане в експлоатация/) на възлови разпределителни станции 20 (10) kV и изграждане на вериги на телемеханика в регион „Ловеч - Враца“, регион „Монтана – Видин“ и регион „Плевен“

## ДЕКЛАРИРАМ, ЧЕ :

че предложеното от нас оборудване в процедурата, отговаря на минималните технически **ИЗИСКВАНИЯ КЪМ КОМУНИКАЦИЯ НА ЦЗ И КОНТРОЛЕР С RTU**, посочени в таблица 8, както следва:

№	Параметър/характеристика	Минимални технически изисквания
1.	Всяка защита и контролер да притежава стандартен интерфейс за комуникация по Ethernet, RS-485 или оптичен интерфейс, стандартен интерфейс за комуникация с персонален компютър и съответно програмно осигуряване.	Да
-	Комуникацията между RTU и ЦЗ, чрез оптичен интерфейс се осъществява с HFBR-4516Z connector .	Да
-	Комуникацията между RTU и ЦЗ, чрез четирипроводна или двупроводна мрежа RS-485 се осъществява с RJ-45.	Да
-	Комуникацията между ЦЗ и персонален компютър се осъществява с USB порт.	Да
-	Комуникационния интерфейс за връзка с RTU да се счита като неразделна част от ЦЗ. Комуникационния интерфейс да има светодиодна индикация за режима на работа.	Да
2.	ЦЗ трябва да включва система за самоконтрол и самодиагностика, на комуникациите с вътрешни и външни потребители.	Да
3.	Наличие на сменяема парола за достъп до данните за настройките на комуникационните функции.	Да
4.	Наличие на стандартен интерфейс и протокол съгласно <b>MODBUS TCP/IP</b> и <b>IEC 61850</b> по жична връзка с локална мрежа за предаване на информацията .	Да
5.	Потребителска настройка на комуникацията по комуникационен протокол:	-
-	При осъществяване на комуникацията по комуникационен протокол съгласно БДС EN 61850-5	Потребителска настройка на IP адрес на ЦУ (ЦЗ и контролер)
-	При осъществяване на комуникацията по комуникационен протокол съгласно MODBUS TCP/IP	Потребителска настройка на MODBUS server адрес на ЦУ (ЦЗ и контролер)
6.	Предаване на данни :	Адресите на всички цифрови входове, цифрови изходи, аналогови входове и изчислени аналогови величини по съответният комуникационен протокол

Дата 31.10.2019 г.

Декларатор:

На основание чл.36а ал.3 от ЗОП

381