SIEMENS

Prüf-Nr./Q-Nr.: *Certificate No.:* **3145**

Dienststelle: *Department:* **I IA CE CP R&D-VI 4 / Kulzer**

Ort: *Place:* **Amberg** Tag: *Date:* **20.09.2012**

Anlagen: *Enclosures:* **Test Report 12083ENV**

Prüfbescheinigung / *Test – Certificate*

Erzeugnis / *Product:* **Überlastrelais / Overload relay S6, S10/S12**

Typ: *Type:* **3RB20... / 3RB21...** Tech. Daten: *Specification:* **U_e = 250V / 230 V, I_{th} = 0.1 – 630A** Hersteller: *Manufacturer:* **Siemens AG I IA CE**

Art der Prüfung / *Type of test:* **Type Test, Railway**

Prüfer / *Tested by:* **R&D-VI 2 / Mrs. Herger**

Labor / *Laboratory:* **LOVAG registered and DAkkS accredited Testing Laboratory Siemens AG, Amberg**

Angewandte Prüfbestimmungen / *Test specifications applied:*
IEC 61373:2010-05
DIN EN 61373:2011-04

Durchgeführte Prüfungen / *Tests conducted:*
Long life test, Functional test, Shock

Prüfergebnis / *Test results:*
All requirements of the test specification are met.

Bemerkungen / *Remarks:* **Issued: 20.09.2012**

Unterschrift / *Signature*

Gegengezeichnet / *Released by:*

i.V. *I IA CE CP R&D-VI Mr. Schweiger*

i.V. *I IA CE CP R&D-EN Mr. Knauer*

SIEMENS AG **Industry Sector**

S. Russwurm (Head)

SIEMENS

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-11055-04-01

Test Report No. 12083ENV

Test laboratory:	Type Test Center Siemens AG Amberg 92220 Amberg, Werner–von–Siemens-Str. 48
Client:	Siemens AG, I IA CE CP R&D-EN 92220 Amberg, Werner-von-Siemens-Str. 48
Manufacturer:	Siemens AG, I IA CE 92220 Amberg, Werner-von-Siemens-Str. 48
Test object:	overload relays size S6 and size S10/S12
Type designation:	3RB20.. / 3RB21..
Date(s) of receipt:	2012-08-10
Date(s) of test(s):	2012-09-03 – 2012-09-11
Test specification:	DIN EN 61373 (2011-04) IEC 61373 (2010-05)
Test results:	In accordance with the test specification.

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The Record of Proving Test consists of:

1 pages: cover sheet	2 pages: supplements
16 pages: test report	- pages: drawings
- pages: description test facilities	- pages: photographs
- pages: attachments	

Date of issue: 2012-09-18

Responsible Test Laboratory

Type Test Center
Siemens AG Amberg

Signatures: .....

(Tested by)
Autorized representative
Mrs. Herger

.....

(Reviewed by)
Laboratory Manager
Mr. Bogner

Note:
The test result relates only to the items tested.
The test report shall not be reproduced except in full without the written approval of the test laboratory.

Contents:

1. Summary of testing

Sample No. 12083EN	Tests		
	Long life test **according to: DIN EN 61373 part 9.1**	**Functional test** **according to: DIN EN 61373 part 8.1**	**shock** **according to: DIN EN 61373 part 10.5 1)**
001	passed	passed	50m/s²
002	passed	passed	50m/s²
003	passed	passed	50m/s²
004	passed	passed	30m/s²
005	passed	passed	50m/s²

1) shock passed by this test sample, shock duration: 30ms

2. Description of the EUT

Nomenclature breakdown: 3RB20.. / 3RB21..

3RB2	0	5	6	-	1	F	W	2
I	**II**	**III**	**IV**		**V**	**VI**	**VII**	**VIII**

I Basic Type
- 3RB2 - Solid-state overload relay

II Function
- 0 - self powered
- 1 - self powered with earth ground indication

III Size
- 5 - Size S6
- 6 - Size S10/S12

IV Reset Type
- 3 - manual or automatic reset or remote reset
- 6 - manual or automatic reset

V Tripping Class
- 1 - Class 10
- 2 - Class 20
- 4 - Class 5, 10, 20 or 30, adjustable

VI Setting Range
- F - 50 – 200 A (only for size S6)
- G - 55 – 250 A (only for size S10/S12)
- M - 160 – 630 A (only for size S10/S12)

VII Type of Terminals
- C - bus bars for main and screw terminals for auxiliary circuit
- F - bus bars for main and spring terminals for auxiliary circuit
- W - straight through system for main and screw terminals for auxiliary circuit (only for size S6)
- X - straight through system for main and spring terminals for auxiliary circuit (only for size S6)

VIII Mounting
- 2 - direct mounting to the contactor and separate mounting

Continuation: Nomenclature Breakdown

Accessories:

3RT1955-4G	Box terminal block for size S6
3RT1966-4G	Box terminal block for size S10/S12
3RT1956-4EA1	Terminal cover for cable lugs and busbar connections size S6
3RT1966-4EA1	Terminal cover for cable lugs and busbar connections size S10/S12
3RT1956-4EA3	Terminal cover for screw terminals size S6
3RT1966-4EA3	Terminal cover for screw terminals size S10/S12

Tested devices:

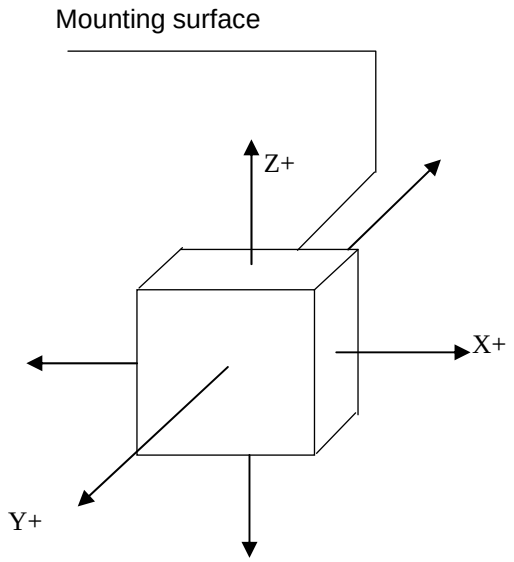
Sample No. 12083EN	Device no	Tested device	Type designation	Date code	mounting	monitoring
001	-001	overload relays size S6	3RB2153-4FW2	E04; G/120723	snap mounted	all contacts
002	-002	overload relays size S6	3RB2153-4FX2	E04; G/120723	screw mounted	all contacts
003	-003	overload relays size S10/S12	3RB2163-4MF2	E04; G/120723		all contacts
004	-004	overload relays size S6	3RB2153-4FW2	E04; G/120723		all contacts
	-005	contactor	3RT1054-1AP36	E01; G/120625		all contacts
005	-006	overload relays size S10/S12	3RB2163-4MF2	E04; G/120723		all contacts
	-007	contactor	3RT1075-6AP36	E01; G/120718		all contacts

Other distinguishing marks:

Sample 12083EN003 was tested with two box terminal blocks 3RT1966-4G (E01; G/120625) on the line side and the load side of the overload relays.
Sample 12083EN004 was tested with two box terminal blocks 3RT1955-4G on the line side and the load side of the overload relays. The box terminal blocks were part of the scope of delivery of the contactor.
Sample 12083EN005 was tested with two terminal covers 3RT1966-4EA1 (E01; J2/120706) on the line side of the contactor and the load side of the overload relays and one terminal cover 3RT1966-4EA3 (E01; J2/120202) between contactor and overload relays

These test samples cover the devices, mentioned in the nomenclature breakdown (page 4 to page 5).

Mounting arrangement and axis description



3. Tests conducted

3.1 Long life test

Date of test: 2012-09-03 – 2012-09-11

3.1.1 Test requirements

Tests conducted according to:

DIN EN 61373 (2011-04)	IEC 61373 (2010-05)	railway applications
IEC 60068-2-47 (2005-04)	DIN EN 60068-2-47 (2006-03)	mounting of the test assemblies

3.1.2 Test procedure

3.1.2.1 Test values

long life test according to DIN EN 61373 part 9.1 and IEC 61373 part 9.1

test	frequency range Hz	load duration each axis	category 1 , class B		orientation
			ASD – level $(m/s^2)^2/Hz$	RMS value m/s^2	
long life test	5 – 150Hz	5 h	0,964	5,72	Vertical Transverse Longitudinal

3.1.2.2 Controlled contacts

Controlled contacts of an overload relays size S6 and S10/12 3RB20.. / 3RB21:

Main circuit:	L1-T3
Remote reset:	A3-A4
Aux. circuit int.:	95-96; 97-98

Controlled contacts of a contactor 3RT1054-1AP36 and 3RT1075-6AP36

Main contacts:	L1-T3
Control circuit:	A1-A2
Aux. circuit ext.:	13-14, 21-22, 31-32, 43-44 (2x 3RH1921-1DA11)

3.1.2.3 Operating conditions

Condition 1: contactor switch on, overload relays reset
Condition 2: contactor switch off, overload relays set

3.1.2.4 Failure criterion

- Fall down of the device under test from the fixture
- Mechanical damage of the device under test
- Functional failure of the device under test
- State changes of the controlled contacts >3ms

If there is any deviation during the vibration test with the values according to 3.1.2.1 Test values, the results have to be mentioned in 3.1.3 Test results

3.1.2.5 Function test

- Monitoring of the contacts with a Yokogawa Scope Corder in conditions according to 3.1.2.3 Operating conditions
- The controlled contacts are described in 3.1.2.2 Controlled contacts
- Switching actions before, during and after the test, according to 3.1.2.3 Operating conditions

- The test current on the main contacts of each sample in on condition is mentioned in the table below.

Sample No. 12083ENTM	rated current [A]	test current (0.9xrated current) [A]	contacts
001	50	45	main contacts
002	50	45	main contacts
003	160	144	main contacts
004	50	45	main contacts
005	160	144	main contacts

3.1.2.6 Mounting description

All snap mounted test samples were tested with solid mounting rails 7,5 mm x 35 mm.

The screw mounted test samples were mounted with a torque according to the following table.

Sample No. 12083ENTM	screw mounted device	torque for screw mounting [Nm]
002	3RB2153-4FX2	2,0
.003	3RB2163-4MF2	2,0
004	3RT1054-1AP36	3,5
005	3RT1075-6AP36	5,0

All test samples were mounted according to IEC 60068-2-47 and DIN EN 60068-2-47.

3.1.3 Test results

All test samples were tested according to 3.1.1 Test requirements and 3.1.2 Test procedure.
The requirements were met.

3.2 Functional test

Date of test: 2012-09-03 – 2012-09-11

3.2.1 Test requirements

Tests conducted according to:

DIN EN 61373 (2011-04)	IEC 61373 (2010-05)	railway applications
IEC 60068-2-47 (2005-04)	DIN EN 60068-2-47 (2006-03)	mounting of the test assemblies

3.2.2 Test procedure

3.2.2.1 Test values

functional test according to DIN EN 61373 part 8.1 and IEC 61373 part 8.1

test	frequency range Hz	load duration each axis	category 1 , class B		orientation
			ASD – level $(m/s^2)^2/Hz$	RMS value m/s^2	
functional test	5 – 150Hz	10 min	0,0301	1,01	Vertical Transverse Longitudinal

3.2.2.2 Controlled contacts

Controlled contacts of an overload relays size S6 and S10/12 3RB20.. / 3RB21:

Main circuit:	L1-T3
Remote reset:	A3-A4
Aux. circuit int.:	95-96; 97-98

Controlled contacts of a contactor 3RT1054-1AP36 and 3RT1075-6AP36

Main contacts:	L1-T3
Control circuit:	A1-A2
Aux. circuit ext.:	13-14, 21-22, 31-32, 43-44 (2x 3RH1921-1DA11)

3.2.2.3 Operating conditions

Condition 1:	contactor switch on, overload relays reset
Condition 2:	contactor switch off, overload relays set

3.2.2.4 Failure criterion

- Fall down of the device under test from the fixture
- Mechanical damage of the device under test
- Functional failure of the device under test
- State changes of the controlled contacts >3ms

If there is any deviation during the vibration test with the values according to 3.2.2.1 Test values, the results have to be mentioned in 3.2.3 Test results

3.2.2.5 Function test

- Monitoring of the contacts with a Yokogawa Scope Corder in conditions according to 3.2.2.3 Operating conditions
- The controlled contacts are described in 3.2.2.2 Controlled contacts
- Switching actions before, during and after the test, according to 3.2.2.3 Operating conditions

- The test current on the main contacts of each sample in on condition is mentioned in the table below.

Sample No. 12083ENTM	rated current [A]	test current (0.9xrated current) [A]	contacts
001	50	45	main contacts
002	50	45	main contacts
003	160	144	main contacts
004	50	45	main contacts
005	160	144	main contacts

3.2.2.6 Mounting description

According to 3.1.2.6

3.2.3 Test results

All test samples were tested according to 3.2.1 Test requirements and 3.2.2 Test procedure.
The requirements were met.

3.3 Shock test

Date of test: 2012-09-03 – 2012-09-11

3.3.1 Test requirements

Tests conducted according to:

DIN EN 61373 (2011-04)	IEC 61373 (2010-05)	railway applications
IEC 60068-2-47 (2005-04)	DIN EN 60068-2-47 (2006-03)	mounting of the test assemblies

3.3.2 Test procedure

3.3.2.1 Test values

shock test according to DIN EN 61373 part 10.5 and IEC 61373 part 10.5

test	orientation	peak acceleration m/s^2	nominal duration ms	standard specific. paragraph
shock test	Vertical Transverse Longitudinal	30 30 50	30	10.5

3.3.2.2 Controlled contacts

Controlled contacts of an overload relays size S6 and S10/12 3RB20.. / 3RB21:

Main circuit:	L1-T3
Remote reset:	A3-A4
Aux. circuit int.:	95-96; 97-98

Controlled contacts of a contactor 3RT1054-1AP36 and 3RT1075-6AP36

Main contacts:	L1-T3
Control circuit:	A1-A2
Aux. circuit ext.:	13-14, 21-22, 31-32, 43-44 (3RH1921-1DA11)

3.3.2.3 Operating conditions

Condition 1:	contactor switch on, overload relays reset
Condition 2:	contactor switch off, overload relays set

3.3.2.4 Failure criterion

- Fall down of the device under test from the fixture
- Mechanical damage of the device under test
- Functional failure of the device under test
- State changes of the controlled contacts >3ms

If there is any deviation during the vibration test with the values according to 3.3.2.1 Test values, the results have to be mentioned in 3.3.3 Test results

3.3.2.5 Function test

- Monitoring of the contacts with a Yokogawa Scope Corder in conditions according to 3.3.2.3 Operating conditions
- The controlled contacts are described in 3.3.2.2 Controlled contacts
- Switching actions before, during and after the test, according to 3.3.2.3 Operating conditions

- The test current on the main contacts of each sample in on condition is mentioned in the table below.

Sample No. 12083ENTM	rated current [A]	test current (0.9xrated current) [A]	contacts
001	50	45	main contacts
002	50	45	main contacts
003	160	144	main contacts
004	50	45	main contacts
005	160	144	main contacts

3.3.2.6 Mounting description

According to 3.1.2.6

3.3.3 Test results

All test samples were tested according to 3.3.1 Test requirements and 3.3.2 Test procedure. Every orientation of the EUT was passed with a peak acceleration of 50 m/s² except for sample 12083EN004. For details see table below:

sample 12083EN	tested device	operating condition	shock: half-sine 30ms [m/s²]					
			X		Y		Z	
			pos	neg	pos	neg	pos	neg
004	-004	1 and 2	50	50	50	50	50	50
	-005	1	50	50	50	50	50	50
		2	50	50	30	50	50	50

The requirements were met.

4. Measuring- /test equipment and calibration

4.1 Test equipment:

Electrodynamic shaker for simulating movements in z-axis:
(calibration-no.: PE-5150-03-004)

shaker	: RMS Typ SW 8200
amplifier system	: RMS TGA 12000
vibration controller	: RMS SWR 1200
charge amplifier	: RMS SWE 379 : RMS SWE 366

last calibration: 03/2012
next calibration: 03/2013

Electrodynamic shaker for simulating movements in x- and y-axis:
(calibration-no.: PE-Schwing-2)

shaker	: RMS Typ SW 5-440-SWH 700 APP
amplifier system	: RMS TGA 10-5/2
vibration controller	: RMS SWR 1200

last calibration: 03/2012
next calibration: 03/2013

4.2 Measuring equipment:

Test sequence/Test	Date of Test	Test equipment designation	Number	Last calibration	Next calibration
Long life test and functional test	2012-09-03 to 2012-09-11	multimeter	EC-DMM-74-024	2012-02	2013-02
		Scope Corder	EC-OSZI-65-060	2011-11	2012-11
		Scope Corder	EC-OSZI-65-061	2012-02	2013-02
		dynamometric screwdriver type II/A 20-100 Nm	MC-5162-97-016	2012-03	2013-03
		dynamometric screwdriver type I/D 30-150 Ncm	MC-5162-30-007	2012-04	2013-04
		dynamometric screwdriver type I/B 5-50 Nm	MC-5162-88-003	2012-03	2013-03
		dynamometric screwdriver type I/B 0-17 Nm	MC-5162-75-003	2012-04	2013-04
		multimeter	EC-DMM-37-077	2012-07	2013-07
		clip-on ampere meter	EC-STRZ-60-024	2012-03	2013-03
		clip-on ampere meter	EC-STRZ-60-025	2012-03	2013-03
		clip-on ampere meter	EC-STRZ-05-010	2012-07	2013-07
		temperature and humidity analyser	PE-8000-00-095	2012-03	2013-02
		temperature and humidity analyser	PE-8000-00-096	2012-03	2013-02

Test sequence/Test	Date of Test	Test equipment designation	Number	Last calibration	Next calibration
shock test	2012-09-03 to 2012-09-11	multimeter	EC-DMM-74-024	2012-02	2013-02
		Scope Corder	EC-OSZI-65-060	2011-11	2012-11
		Scope Corder	EC-OSZI-65-061	2012-02	2013-02
		dynamometric screwdriver type II/A 20-100 Nm	MC-5162-97-016	2012-03	2013-03
		dynamometric screwdriver type I/D 30-150 Ncm	MC-5162-30-007	2012-04	2013-04
		dynamometric screwdriver type I/B 5-50 Nm	MC-5162-88-003	2012-03	2013-03
		dynamometric screwdriver type I/B 0-17 Nm	MC-5162-75-003	2012-04	2013-04
		multimeter	EC-DMM-37-077	2012-07	2013-07
		clip-on ampere meter	EC-STRZ-60-024	2012-03	2013-03
		clip-on ampere meter	EC-STRZ-60-025	2012-03	2013-03
		clip-on ampere meter	EC-STRZ-05-010	2012-07	2013-07
		temperature and humidity analyser	PE-8000-00-095	2012-03	2013-02
		temperature and humidity analyser	PE-8000-00-096	2012-03	2013-02

Supplements – Test assemblies sample 12083EN001 to 12083EN005

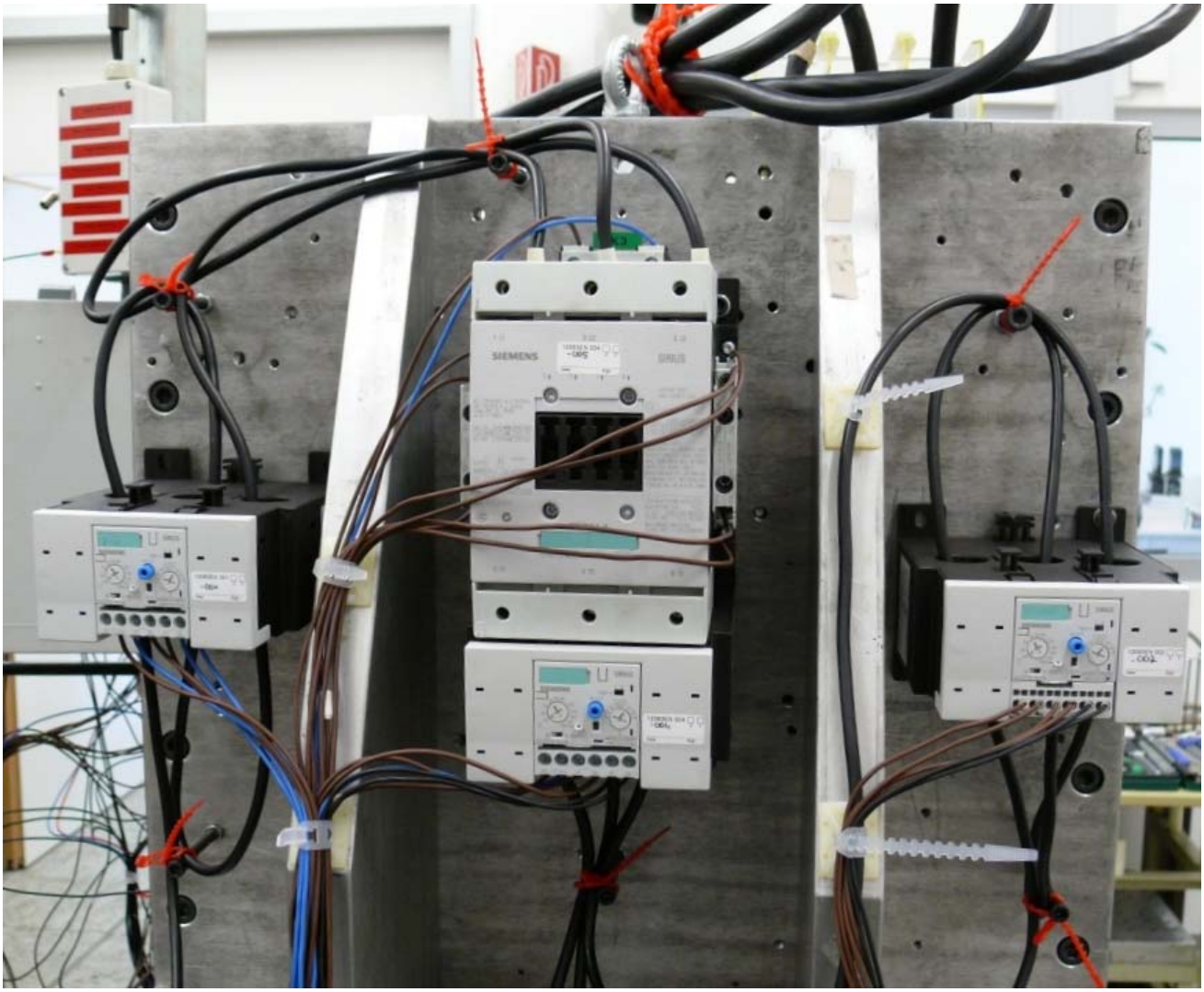


figure 1: sample 12083EN001, 12083EN004 and 12083EN002

figure 2: sample 12083EN005 and 12083EN003