Eidgenössisches Starkstrominspektorat
Inspection fédérale des installations à courant fort
Ispettorato federale degli impianti a corrente forte
Federal Inspectorate for Heavy Current Installations

SCES 033

Z Zertifizierungsstelle
B Bewilligung
S Sicherheitszeichen

Matsushita Electric Works
(Schweiz) AG
Grundstrasse 8
6343 Rotkreuz

Kundennummer	Ihr Zeichen	Unser Zeichen	Datum
872	F.Plappert	Mi	22.06.2004

Bewilligung

Nummer: **04.0677**
gültig bis: **21.06.2009**

Kennzeichnung: SZ 58
NAIS Logo

Aufgrund der Unterlagen im Dossier Nr. **04-IK-0081** erteilt das Eidgenössische Starkstrominspektorat der oben genannten Firma das Recht, nachstehende(s) Erzeugnis(se) mit dem Sicherheitszeichen gekennzeichnet, gemäss NEV, in Verkehr zu bringen.

Erzeugnis: **Relais**
Handelsmarken: **MATSUSHITA**
NAIS

Typenbezeichnung	Nenndaten
SFN4D-DC.V **SFN4D-DC..V**	gemäss Beilage

Schutzklasse:
Schutzgrad:
Grundlagen: Test Report / electrosuisse / 04-IK-0081.01 vom 26.04.2004
Prüfbericht / TÜV Rheinland / 968/EZ 177.00/04 vom 11.05.2004

Bemerkung: Typenschlüssel, Nenndaten,Charakteristiken und weitere Spezifikationen gemäss Preliminary SFN4D Seiten 1 und 2 vom 28.April 2004.

Prüfnormen:

EN 60947-1:1999+A1:00+A2:01
EN 60947-5-1:1997+A12:99+A1:99+A2:00
EN 61810-1:1999
EN 61810-5:1999
IEC 61810-7:1997
EN 60255-23:1997

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TEST REPORT

EN/IEC 60 947-5-1

Low-voltage switchgear and control gear
Part 5: Control circuit devices and switching elements

Section 1: Electromechanical control circuit devices

Report reference No.:	04-IK-0080.01
Compiled by (+ signature) ..... :	Ernst Pinggera
Approved by (+ signature) ..... :	Bernardo Rieder
Date of issue ..... :	26.04.2004
CCA Testing Laboratory Name:	SEV Swiss Electrotechnical Association
Address ..... :	Luppmenstrasse 1, CH-8320 Fehraltorf
Testing location/procedure ..... :	CCATL ☐ SMT ☐ TMP ☐
Address ..... :	as above
Applicant's Name:	Matsushita Electric Works (Europe) AG
Address :	Rudolf-Diesel-Ring 2, D-83607 Holzkirchen
Test specification	
Standard ..... :	EN 60947-5-1:97+A12:99+A1:99+A2:00 see also EN 60947-1:99+A1:00+A2:01
Test procedure ..... :	Component test: Test sequences: II, III and IV
Procedure deviation ..... :	None
Non-standard test method ..... :	None
Test Report Form	609475-1A
TRF originator ..... :	ÖVE (SEV)
Master TRF (date) ..... :	Dated 1995-09 (2002-07)

STS 001

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Test item description:	
Trademark ..... :	Matsushita; NAIS
Model/type reference ..... :	SFN4D-DC **24V**
Manufacturer ..... :	Matsushita Electric Works (Europe) AG
Address ..... :	Rudolf-Diesel-Ring 2, D-83607 Holzkirchen
Ratings ..... :	AC-15: 6A, 230V; DC-13: 6A, 24V
Markings ..... :	See page 4

Test item particulars:	
Control switching elements	
- method of operation ..... :	Electro mechanical
- switching positions ..... :	2
- number of circuits..... :	6
- kind of current ..... :	AC / DC
- number and kind of contact elements ..... :	4a) 4A; 2B
- rated frequency (Hz) ..... :	50/60 Hz
- number of positions of main contacts..... :	2
- Tamb. ..... :	standard
- Rated coil voltage..... :	24VDC
- Degree of Protection	---
Rated and limiting values, main circuit	
- contact material..... :	$AgSnO_2$ with Au flash
- rated operational voltage Ue (V)..... :	230VAC
- rated insulation voltage Ui (V)..... :	---
- rated impulse withstand voltage Uimp (kV)..... :	---
- overvoltage category.....	---
- conventional free air thermal current Ith (A).....	---
- conventional enclosed thermal current Ithe (A).:	---
- rated uninterrupted Iu (A)..... :	---
- pollution degree..... :	---
- utilization category..... :	AC-15: 6A, 230V DC-13: 6A, 24V
Short-circuit characteristik:	
- rated conditional short-circuit current (kA)..... :	1 kA
Co-ordination of short-circuit protective devices..:	
- kind of protective device ..... :	6A gG, DII 500V

Possible test case verdicts :	
Test case does not apply to the test object :	N (A.)
Test item does meet the requirement :	P(ass)
Test item does not meet the requirement :	F(ail)
Test case not checked :	---

Testing	
Date of receipt of test item :	08.03.2004
Date(s) of performance of test :	26.04.2004

General remarks

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a comma (point) is used as the decimal separator.
This test report is not valid as a Test Report according to a MRA (example CCA, ENEC, Keymark) or a private scheme (example SEV system no. 5) unless appended to a corresponding certificate issued by a participating or authorized certification body, in accordance with the rules of the MRA or the private scheme.

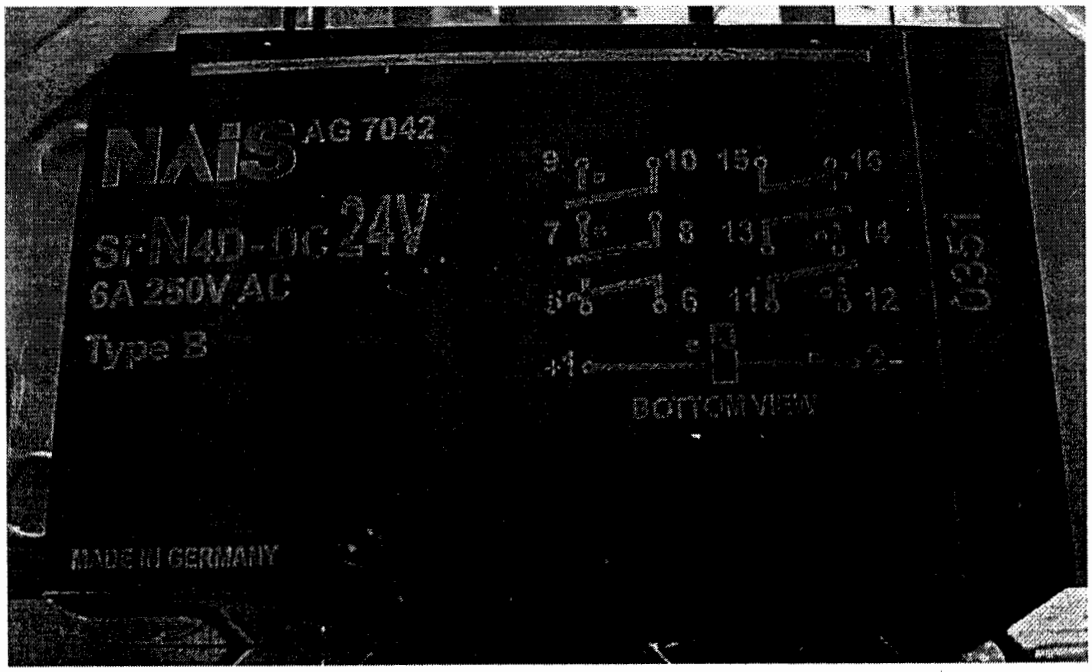
Remarks:

Test items do meet the requirements of EN 60947-5-1
Test sequence II, II and IV

Test overview

EN 60947-5-1					
Test sequences	Test no. 1	Test no. 2	Test no. 3	Test no. 4	Sample no:
I	---	---	---	---	N
II	X	X	---	---	II 1; II 2; II 3; II 4;
III	X	X	---	---	III 1; III 2; III 3; III 4;
IV	X	X	---	---	IV 1; IV 2
V	---	---	---	---	N
VI	---	---	---	---	N
Annex J	---	---	---	---	N
Annex K VII	---	---	---	---	N
Annex K VIII	---	---	---	---	N
EN/IEC 60947-5-5					
7.3.2, 7.4, 7.5, 7.6, 7.7	---				N

Markings:



EN 60 947-5-1				
Clause	Requirement - Test	Result - Remark		Verdict
8.3.3.5	TEST SEQUENCE II			
8.3.3.5.2	Making and breaking capacity under normal conditions			(AC)
	Sample no:	II 1	II 2	P
	- contact material ..... :	$AgSnO_2$ with Au flash		P
	- utilization category ..... :	**AC-15**	**AC-15**	P
	- rated operational voltage Ue (V) ..... :	230VAC	230VAC	P
	- rated operational current Ie (A) ..... :	6A	6A	P
	- number of cycles	6050	6050	P
	- tested contact ..... :	**NO**	NØC	P
	- Test circuit: figure	6	6	P
	Conditions, make/break operations for the first 50 cycles			
	- Test sequence no. 1 50 operations at 10 s intervals. (6/min)	ok	ok	P
	- test voltage U/Ue = 1,1 (V) ..... :	253VAC	253VAC	P
	- make test current I/Ie = 10 (A AC) = 1 A DC) ..... :	66A	66A	P
	- break test current I/Ie = 1.0 (A) ..... :	6A	6A	P
	- power factor/time constant ..... :	0.3	0.3	P
	- on-time (ms) ..... :	50ms	50ms	P
	Test conditions, make/break operations for following 6000 cycles			
	- Test sequence no.2 10 operations as rapidly as possible whilst ensuring complete closing and opening of contacts.	0.5s	0.5s	P
	- Test sequence no.3 990 operations at 1s intervals. (60/min) (or fast as the device will permit)	1s	1s	P
	- Test sequence no.4 5000 operations at 10 s intervals. (6/min)	10s	10s	P
	- test voltage U/Ue = 1,0 (V) ..... :	230VAC	230VAC	P
	- make test current I/Ie = 10 (A) ..... :	60A	60A	P
	- break test current I/Ie = 1.0 (A) ..... :	6A	6A	P
	- power factor/time constant ..... :	0.3	0.3	P
	- on-time (ms) ..... :	50ms	50ms	P
	- total number of make/break operations ..... :	6000	6000	P

6050 6050

EN 60 947-5-1				
Clause	Requirement - Test	Result - Remark		Verdict
8.3.3.5.5	Behaviour and condition during and after the test:			
	- no permanent arcing	ok	ok	P
	- no flashover between poles.....	ok	ok	P
	- no electrical and mechanical failures	ok	ok	P
	- no blowing of the fusible element in the earth circuit.....	ok	ok	P
	- no welding of the contacts.....	ok	ok	P
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control	ok	ok	P
	Dielectric verification:			
	test voltage (V) (2 Ue or min. 1000 V) for 1 min ....:	1000V	1000V	P

EN 60 947-5-1			
Clause	Requirement - Test	Result - Remark	Verdict

8.3.3.5	TEST SEQUENCE II			
8.3.3.5.2	Making and breaking capacity under normal conditions			(DC)
	Sample no:	II 3	II 4	P
	- contact material ..... :	$AgSnO_2$ with Au flash		P
	- utilization category ..... :	**DC-13**	**DC-13**	P
	- rated operational voltage Ue (V) ..... :	24VDC	24VDC	P
	- rated operational current Ie (A) ..... :	6A	6A	P
	- number of cycles	6050	6050	P
	- tested contact ..... :	**NO**	**NC**	P
	- Test circuit: figure	6	6	P
	Conditions, make/break operations for the first 50 cycles			
	- Test sequence no. 1 50 operations at 10 s intervals. (6/min)	ok	ok	P
	- test voltage U/Ue = 1,1 (V) ..... :	26.4VDC	26.4VAC	P
	- make test current I/Ie = 10 (A AC) = 1 (A DC) ..... :	6.6A	6.6A	P
	- break test current I/Ie = 1.0 (A AC/DC) ..... :	6.6A	6.6A	P
	- power factor/time constant ..... :	300ms	300ms	P
	- on-time (ms) ..... :	310ms	310ms	P
	Test conditions, make/break operations for following 6000 cycles			
	- Test sequence no.2 10 operations as rapidly as possible whilst ensuring complete closing and opening of contacts.	0.5s	0.5s	P
	- Test sequence no.3 990 operations at 1s intervals. (60/min) (or fast as the device will permit)	1s	1s	P
	- Test sequence no.4 5000 operations at 10 s intervals. (6/min)	10s	10s	P
	- test voltage U/Ue = 1,0 (V) ..... :	24VDC	24VDC	P
	- make test current I/Ie = 1.0 (A) ..... :	6A	6A	P
	- break test current I/Ie = 1.0 (A) ..... :	6A	6A	P
	- power factor/time constant ..... :	300ms	300ms	P
	- on-time (ms) ..... :	310ms	310ms	P
	- total number of make/break operations ..... :	6000	6000	P

6050 6050

EN 60 947-5-1				
Clause	Requirement - Test	Result - Remark		Verdict
8.3.3.5.5	Behaviour and condition during and after the test:			
	- no permanent arcing	ok	ok	P
	- no flashover between poles.....	ok	ok	P
	- no electrical and mechanical failures	ok	ok	P
	- no blowing of the fusible element in the earth circuit.....	ok	ok	P
	- no welding of the contacts.....	ok	ok	P
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control	ok	ok	P
	Dielectric verification:			
	test voltage (V) (2 Ue or min. 1000 V) for 1 min ....:	1000V	1000V	P

EN 60 947-5-1			
Clause	Requirement - Test	Result - Remark	Verdict

	Test sequence III			(AC)
8.3.3.5.3	Making and breaking capacities of switching elements under abnormal conditions:			
	Snap action switching elements			
	Sample no:	IIII 1	III 2	P
	- contact material :	AgSnO2 with Au flash		P
	- utilization category :	AC-15	AC-15	P
	- rated operational voltage Ue (V) :	230VAC	230VAC	P
	- rated operational current Ie (A) :	6A	6A	P
	- tested contact :	NO	NC	P
	- Test circuit: figure	6	6	P
	Conditions, make/break operations:			
	- test voltage U/Ue = 1,1 (V) :	253VAC	253VAC	P
	- make/break operations: test current I/Ie (A) 10x :	60A	60A	P
	- power factor/time constant (ms) . :	0.3	0.3	P
	- on-time (ms) :	50ms	50ms	P
	- operating cycles per minute :	6	6	P
	- number of operating cycles :	10	10	P
8.3.3.5.5	Behaviour and condition during and after the test:			
	- no permanent arcing	ok	ok	P
	- no flashover between poles	ok	ok	P
	- no electrical and mechanical failures	ok	ok	P
	- no blowing of the fusible element in the earth circuit	ok	ok	P
	- no welding of the contacts	ok	ok	P
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control	ok	ok	P
	Dielectric verification:			
	test voltage (V) (2 Ue or min. 1000 V) for 1 min :	1000V	1000V	P

EN 60 947-5-1				
Clause	Requirement - Test	Result - Remark		Verdict
	Test sequence III			(DC)
8.3.3.5.3	Making and breaking capacities of switching elements under abnormal conditions:			
	Snap action switching elements			
	Sample no:	IIII 3	III 4	P
	- contact material ..... :	$AgSnO_2$ with Au flash		P
	- utilization category ..... :	**DC-13**	**DC-13**	P
	- rated operational voltage Ue (V) ..... :	24VDC	24VDC	P
	- rated operational current Ie (A) ..... :	6A	6A	P
	- tested contact ..... :	**NO**	**NC**	P
	- Test circuit: figure	6	6	P
	Conditions, make/break operations:			
	- test voltage U/Ue = 1,1 (V) ..... :	26.4VAC	26.4VAC	P
	- make/break operations: test current I/Ie (A) 1.10x ..... :	6.6A	6.6A	P
	- power factor/time constant (ms)..... . :	300ms	300ms	P
	- on-time (ms) ..... :	305ms	305ms	P
	- operating cycles per minute ..... :	6	6	P
	- number of operating cycles ..... :	10	10	P
8.3.3.5.5	Behaviour and condition during and after the test:			
	- no permanent arcing	ok	ok	P
	- no flashover between poles.....	ok	ok	P
	- no electrical and mechanical failures	ok	ok	P
	- no blowing of the fusible element in the earth circuit.....	ok	ok	P
	- no welding of the contacts.....	ok	ok	P
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control	ok	ok	P
	Dielectric verification:			
	test voltage (V) (2 Ue or min. 1000 V) for 1 min .... :	1000V	1000V	P

EN 60 947-5-1				
Clause	Requirement - Test	Result - Remark		Verdict
8.3.4	TEST SEQUENCE IV			(DC)
	Performance under conditional short-circuit current			
	contact material ..... :	$AgSnO_2$ with Au flash		P
	sample no.	IV-1	IV-2	P
	circuit acc. fig.	ok	ok	P
	Contacts	NC	NO	P
	type of SCPD ..... :	DII	DII	P
	ratings of SCPD ..... :	6A gG 500V	6A gG 500V	P
	prospective current (A) ..... :	1000A	1000A	P
	test voltage (V) U/Ue = 1,1 (VAC) ..... :	253VAC	253VAC	P
	r.m.s. test current (A) ..... :	1004A	1004A	P
	power factor (0.5 . . 0.7)	0.67	0.67	P
	first making operation to closed switching elements: test Ipk (A)/ I^2dta (A^2s) ..... :	318Apk 78 A^2s	354Apk 95A^2s	P
	time interval between test (min. 3 min) ..... :	3	3	P
	second making operation to closed switching elements: test Ipk (A)/ I^2dta (A^2s) ..... :	300Apk 132 A^2s	268Apk 65 A^2s	P
	time interval between test (min. 3 min) ..... :	3	3	P
	third making operation to closed switching elements: test Ipk (A)/ I^2dta (A^2s) ..... :	232Apk 78A^2s	158Apk 48A^2s	P
	Behaviour of the equipment after the test:			
	- no blowing of the fusible element in the earth circuit.....	ok	ok	P
	switching elements open by the normal actuating system	ok	ok	P
	Dielectric verification:			
	dielectric test voltage (V) 2 Ue min. 1000 V/1 min	1000V	1000V	P

EN 60 947-5-1			
Clause	Requirement - Test	Result - Remark	Verdict

Item	Type	Inv. No.	Used	Comments
1	Signal Memory Recorder	40.221.400	y	---
2	Hero Ampliflier T602E	40.221.400	y	---
3	Hilo Shunt 1000 A	40.221.400	y	---
4	Hilo Shunt 250 A	40.221.400	n	---
5	Hilo Shunt 60 A	40.221.400	n	---
6	Hilo Shunt 6000 A	40.221.400	n	---
7	Multimeter Norma D3230	40.221.100	y	---
8	Multimeter Fluke 45-015	40.292.300	y	---
9	Multimeter Metex M3650B	40.222.400	y	---
10	Multimeter Metrawatt M2036	40.224.000	n	---
11	Clamp-on Multimeter ITT MX1200S	40.223.800	n	---
12	Clamp-on Multimeter ITT MX200	93.101.000	y	---
13	Resistance Bridge Pontavi WH-2	00.225.001	y	---
14	Microohm-Meter AOIP OM20	40.224.600	n	---
15	Microohm-Meter Resistomat 2304	40.293.900	n	---
16	LCR-Bridge Prism 6458	40.224.700	n	---
17	Insulation-Tester Metrisa 1000V	40.224.100	n	---
18	Insulation-Tester Norma N	40.207.100	n	---
22	Power-Analyzer Norma D-6100	40.226.400	n	---
23	Hybrid-Recorder Yokogawa HR1300	40.291.900	n	---
27	High Voltage Tester Betschard P10S	40.223.000	y	---
28	Leaking-Current Tester Elabo 90-2K	40.226.300	n	---
29	Thermo-Tester Technotherm 9500	40.221.000	n	---
30	Slide calliper Mitutoyo 150mm	93.5070.03	y	---
31	Oven Heraeus	40.227.100	n	---
32	Climatic Cabinet Heraeus VUK 04/300	40.274.900	n	---
33	Tumbling barrel SEV	40.220.400	n	---
34	electrionic force measurement AFG-R 1000N	00.5022.06	n	---
35	Tracking-test apparatus PTL	40.369.200	n	---
36	Terminal turn and pull apparatus	016220.501	n	---
37	Glow-wire-test apparatus	40.365.000	n	---
38	Jointed test finger PTL	95.5087.001	n	---
39	Rigid test finger PTL	95.5087.002	n	---
40	Testpin 3mm PTL	93.5051.100	n	---
41	Testpin 1mm PTL	93.5051.100	n	---
42	Measuring magnifying glass Leitz	93.5070.005	n	---
43	Impact Hammer PTL	40.224.900	n	---