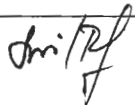
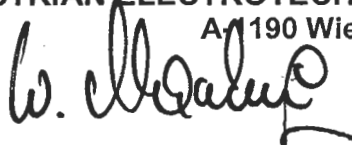


IEC**IECEE**
CB
SCHEME**COPY**

Ref. Certif. No.

AT 1448IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST
CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE)
CB SCHEMESYSTEME CEI D'ACCEPTATION MUTUELLE DE
CERTIFICATS D'ESSAIS DES EQUIPEMENTS
ELECTRIQUES (IECEE) METHODE OC**CB TEST CERTIFICATE**
CERTIFICAT D'ESSAI OC**Product**
Produit**Motor-starter****Name and address of the applicant**
Nom et adresse du demandeur**Benedict GmbH**
A-1220 Wien, Lieblgasse 7**Name and address of the manufacturer**
Nom et adresse du fabricant**Benedict GmbH**
A-1220 Wien, Lieblgasse 7**Name and address of the factory**
Nom et adresse de l'usine**Benedict GmbH**
A-1220 Wien, Lieblgasse 7**Ratings and principal characteristics**
Valeurs nominales et caractéristiques principales**AC 400 V, 50-60 Hz; AC 3**
see page 1 of test reports**Trademark (if any)**
Marque de fabrique (si elle existe)**Ω, Benedikt & Jäger****Model / Type Ref.**
Ref. de type**K3-10A/ -14A/ -18A/ -22A/ -24A/ -32A/ -40A**
+ U3/32**Additional information (if necessary)**
Information complémentaire (si nécessaire)**Meets also requirements acc. to IEC 60947-4-1:2000-11****A sample of the product was tested and found to be in conformity with**
Un échantillon de ce produit a été essayé et a été considéré conforme à la**IEC 60947-4-1(ed.1);am1;am2****As shown in the Test Report Ref. No. which forms part of this Certificate**
Comme indiqué dans le Rapport d'essais numéro de référence qui constitue partie de ce Certificat**CTI-CB 479-1, -2****This CB Test Certificate is issued by the National Certification Body**
Ce Certificat d'essai OC est établi par l'Organisme National de Certification**AUSTRIAN ELECTROTECHNICAL ASSOCIATION**
A-190 Wien, Kahlenberger Str. 2A**Dipl.-Ing. W. Martin****OVE**

Date: 2003-03-27

TEST REPORT IEC 60 947-4-1 Low-voltage switchgear and controlgear Part 4: Contactors and motor-starters Section 1: Electromechanical contactors and motor-starters	
Report reference No. :	CTI – CB 479-1
Tested by (+ signature)	J.Wolf 
Approved by (+ signature)	Ing. H.Bachl 
Date of issue	26.03.2003
Testing laboratory	CTI-Vienna
Address	A – 1210 Vienna, Einzingerasse 4
Testing location	as above
Applicant	Benedict GmbH
Address	A – 1220 Vienna, Liebgasse 7
Standard	IEC 60947-4-1:1990 + A1:1994 + A2:1996
Test Report Form No.	69474-1A
Master TRF	reference No. 69474-1A, dated 95-07
Copyright blank test report	the bodies participating in the Committee of Certification Bodies (CCB) and/or the CENELEC Certification Agreement (CCA).
Test procedure	CB-scheme
Procedure deviation	---
Non-standard test method	---
Type of test object	Motor-starter
Trademark	Ω, Benedikt & Jäger
Model/type reference	K3-10A... + U3/32... K3-14A... + U3/32... K3-18A... + U3/32... K3-22A... + U3/32...
Manufacturer	Benedict GmbH, A – 1220 Vienna, Liebgasse 7
Rating	10A , 14A, 18A, 22A (400V 50-60Hz)

TRF No.: 69474-1A

Copy of marking plate

Contactor K3-10A

AC3 400V~ **10A**
 IEC / EN60947-4-1 AC1=I_{th}
 VDE0660 AS3947-4-1 690V~ 25A

AC2, AC3	220	380	415	500	660
V~	240	400	440	500	690
kW	3	4	4,5	5,5	5,5



MADE IN AUSTRIA

LISTED IND. CONT.
 EQUIP. 93B2
 cULus 600v ac 25amp A600
 v|115|200|230|460|575

3ph hp	1,5	2	3	5	7,5
1ph 2p hp	0,5	1	1,5	3	3

SUITABLE FOR USE ON A CIRCUIT CAPABLE OF DELIVERING NOT MORE THAN 5000 RMS SYMMETRICAL AMPS 600 VOLTS MAX. WHEN PROTECTED BY A FUSE RATED 45 AMP

TIGHTENING TORQUE 8.1 lb.-in.
 14AWG-10AWG
 WIRE 60°C Cu ONLY

Contactor K3-14A

AC3 400V~ **14A**
 IEC / EN60947-4-1 AC1=I_{th}
 VDE0660 AS3947-4-1 690V~ 25A

AC2, AC3	220	380	415	500	660
V~	240	400	440	500	690
kW	4	5,5	6	7,5	7,5



MADE IN AUSTRIA

LISTED IND. CONT.
 EQUIP. 93B2
 cULus 600v ac 25amp A600
 v|115|200|230|460|575

3ph hp	2	3	3	7,5	10
1ph 2p hp	0,75	1,5	2	5	5

SUITABLE FOR USE ON A CIRCUIT CAPABLE OF DELIVERING NOT MORE THAN 5000 RMS SYMMETRICAL AMPS 600 VOLTS MAX. WHEN PROTECTED BY A FUSE RATED 50 AMP

TIGHTENING TORQUE 8.1 lb.-in.
 14AWG-10AWG
 WIRE 60°C Cu ONLY

Contactor K3-18A

AC3 400V~ **18A**
 IEC / EN60947-4-1 AC1=I_{th}
 VDE0660 AS3947-4-1 690V~ 32A

AC2, AC3	220	380	415	500	660
V~	240	400	440	500	690
kW	5	7,5	8,5	10	10



MADE IN AUSTRIA

LISTED IND. CONT.
 EQUIP. 93B2
 cULus 600v ac 30amp A600
 v|115|200|230|460|575

3ph hp	2	3	5	10	15
1ph 2p hp	1	2	3	5	7,5

SUITABLE FOR USE ON A CIRCUIT CAPABLE OF DELIVERING NOT MORE THAN 5000 RMS SYMMETRICAL AMPS 600 VOLTS MAX. WHEN PROTECTED BY A FUSE RATED 70 AMP

TIGHTENING TORQUE 8.1 lb.-in.
 14AWG-10AWG
 WIRE 60°C Cu ONLY

Contactor K3-22A

AC3 400V~ **22A**
 IEC / EN60947-4-1 AC1=I_{th}
 VDE0660 AS3947-4-1 690V~ 32A

AC2, AC3	220	380	415	500	660
V~	240	400	440	500	690
kW	6	11	12	15	10



MADE IN AUSTRIA

LISTED IND. CONT.
 EQUIP. 93B2
 cULus 600v ac 30amp A600
 v|115|200|230|460|575

3ph hp	3	5	7,5	15	20
1ph 2p hp	1,5	3	3	7,5	10

SUITABLE FOR USE ON A CIRCUIT CAPABLE OF DELIVERING NOT MORE THAN 5000 RMS SYMMETRICAL AMPS 600 VOLTS MAX. WHEN PROTECTED BY A FUSE RATED 90 AMP

TIGHTENING TORQUE 8.1 lb.-in.
 14AWG-10AWG
 WIRE 60°C Cu ONLY

Overload Relay U3/32

BENEDIKT & JÄGER U3/32 18

IEC/EN60947 VDE0660 690V~
 Auslöseklasse / Trip class: 10A

13-18A
 Typ 1" gl. (gG) 83A
 Typ 2" gl. (gG) 35A

AC15 I A LISTED IND. CONT. EQ. 93B3
 600v ac 95 98
 95 97
 8600 C600

Max. fuse size **50A**

Suitable for use on a circuit capable of delivering not more than 5kA rms. sym. amps 600V max. Amb. compensated Phase failure sensitive type. Numbers on dial are full load motor currents. Tripping current is 125% of numbers on dial. Tightening torque 8.1 lb.-in.
 Made in Austria 14 AWG - 10 AWG Wire 60°C Cu only

24V 3 STOP 95 98
 230V 2 (TEST) 95 97
 400V 1 440V- 95 97
 690V- 95 97

BENEDIKT & JÄGER U3/32 32

IEC/EN60947 VDE0660 690V~
 Auslöseklasse / Trip class: 10A

23-32A
 Typ 1" gl. (gG) 80A
 Typ 2" gl. (gG) 63A

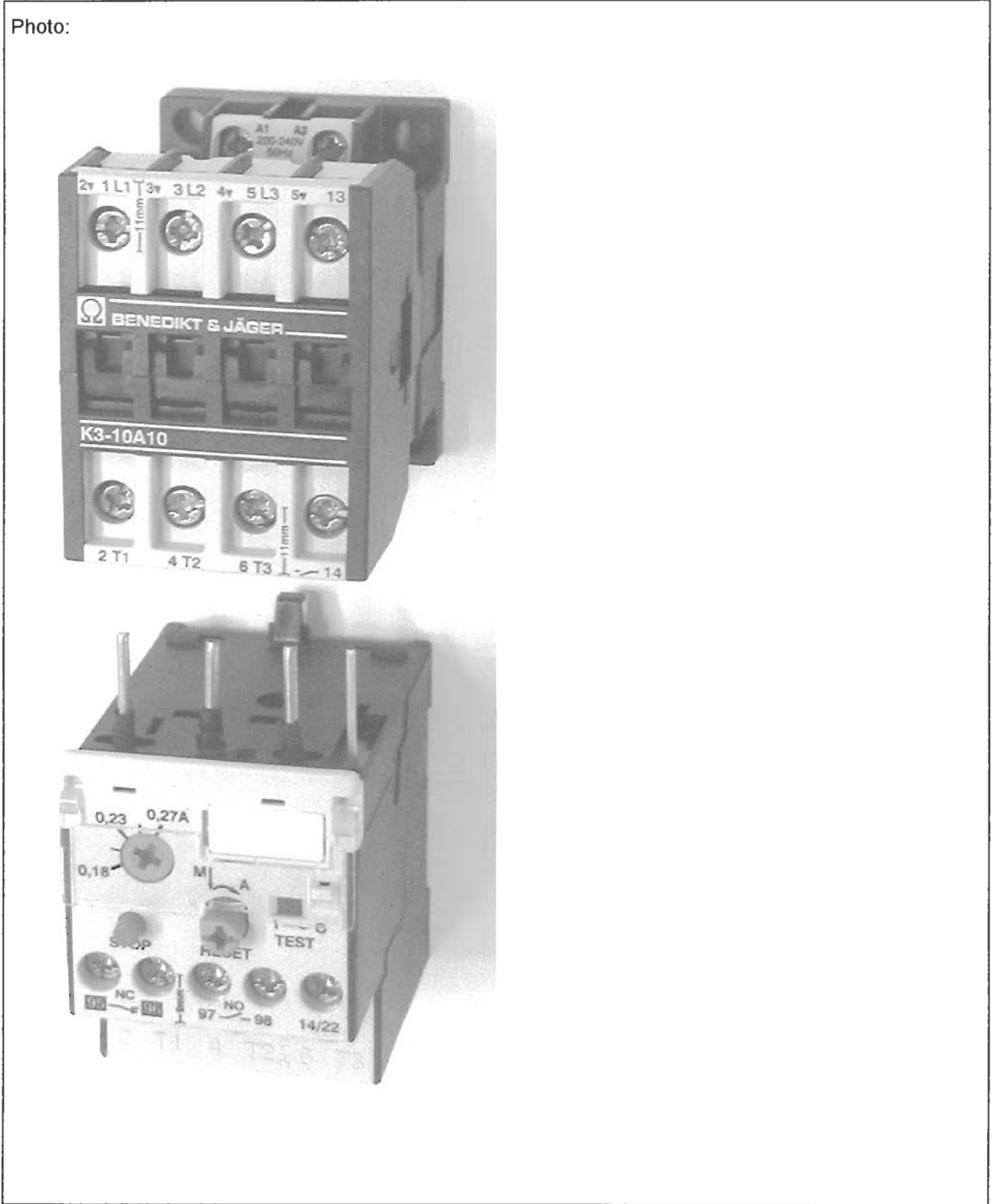
AC15 I A LISTED IND. CONT. EQ. 93B3
 600v ac 95 98
 95 97
 8600 C800

Max. fuse size **70A**

Suitable for use on a circuit capable of delivering not more than 5kA rms. sym. amps 600V max. Amb. compensated Phase failure sensitive type. Numbers on dial are full load motor currents. Tripping current is 125% of numbers on dial. Tightening torque 8.1 lb.-in.
 Made in Austria 14 AWG - 10 AWG Wire 60°C Cu only

24V 3 STOP 95 98
 230V 2 (TEST) 95 97
 400V 1 440V- 95 97
 690V- 95 97

Photo:



TRF No.: 69474-1A

Test item particulars:				
- method of operation	: Magnetic			
- switching positions	: ON-OFF			
- number of poles.....	Contactor: 3 Main 1 Aux			
- kind of current.....	: AC			
- number of phases.....	: 3			
- rated frequency (Hz).....	: 50-60			
- number of positions of main contacts.....	: 2			
Rated and limiting values, main circuit				
- rated operational voltage Ue (V)	: 400			
- rated insulation voltage Ui (V)	: 690			
- rated impulse withstand voltage Uimp (kV).....	: 8			
- conventional free air thermal current Ith (A).....	: 25	: 25	: 32	: 32
- conventional enclosed thermal current Ithe (A)	: -			
- rated operational current Ie (A)	: 10	: 14	: 18	: 22
- rated uninterrupted Iu (A)	: 10	: 14	: 18	: 22
- utilization category.....	: AC3			
Short-circuit characteristic				
- rated prospective short-circuit current "r" (kA)	: 1	: 1	: 3	: 3
- rated conditional short-circuit current Iq (kA)	: 1	: 1	: 3	: 3
Rated and limiting values, auxiliary circuits.....				
- rated operational voltage (V)	: 690			
- rated frequency (Hz).....	: 50-60			
- number of circuits	: 1			
- number and kind of contact elements	: 1 NO or 1 NC			
Co-ordination of short-circuit protective devices				
- kind of protective device.....	: Fuse 63A gL/gG			
Possible test case verdicts:				
- test case does not apply to the test object.....	: N(.A.)			
- test object does meet the requirement.....	: P(ass)			
- test object does not meet the requirement.....	: F(ail)			

General remarks:

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IEC 60947-4-1:2000-11.

"(see remark #)" refers to a remark appended to the report.

"(see appended table)" refers to a table appended to the report.

Throughout this report a comma is used as the decimal separator.

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 testing laboratory.

1. **The Contactor K3-10A... used as part of the motorstarter is covered in CB-AT 1285 / CTI-CB 428-1 (utilization category AC 1) dated 2001-12-03.**
2. **All tests have been performed with K3-10A (= smallest size) contactors with ratings of K3-22A (=biggest size) contactors.**
3. **Test sequences I, II, IV and V have been tested by CTI - staff at manufacturer premises (partly TMP)**
4. **This report also covers the requirements of IEC 60947-4-1:2000-11.**

Ordering key:

Contactor
 K3-10A xxx ... see CB-AT 1285

Overload Relay
 U3/32 x

I >>>> : Setting range 0,12 – 0,18 / 0,18 – 0,27 / 0,27 – 0,4 / 0,4 – 0,6 /
 I 0,6 – 0,9 / 0,8 – 1,2 / 1,2 – 1,8 / 1,8 – 2,7 /
 I 2,7 – 4 / 4 – 6 / 6 – 9 / 8 – 11 / 10 – 14 /
 I 13 – 18 / 17 – 24
 I

I >>>>>>>> : Type number

Test	Sub – clause No.	Sample No.	Motor - starter
Test sequence I			
Verification of temperature - rise	9.3.3.3	1 2	K3 - 10A10 230 + U3/32 13-18 + U3/32 17-24
Verification of operation and operating limits	9.3.3.1 and 9.3.3.2	1 2 3 4 5 6 7 8 9 10 11 12 13	K3 - 10A10 230 + U3/32 13-18 + U3/32 17-24 + U3/32 0,12-0,18 + U3/32 0,18-0,27 + U3/32 0,27-0,4 + U3/32 0,6-0,9 + U3/32 0,8-1,2 + U3/32 1,8-2,7 + U3/32 2,7-4 + U3/32 4-6 + U3/32 6-9 + U3/32 8-11 + U3/32 10-14
Verification of dielectric properties	9.3.3.4	1 2	K3 - 10A10 230 + U3/32 13-18 + U3/32 17-24
Test sequence II			
Verification of rated making and breaking capacities, change – over ability and reversibility	9.3.3.5	14	K3 - 10A10 230 (AC 3)
Verification of conventional operational performance	9.3.3.6	14	K3 - 10A10 230 (AC 3)
Test sequence III			
Performance under short – circuit conditions	9.3.4	15 16 17 18	K3 - 10A10 230 + U3/32 0,12-0,18 + U3/32 10-14 + U3/32 13-18 + U3/32 17-24
Test sequence IV			
Verification of ability to withstand overload currents	9.3.5	19	K3 - 10A10 230 (AC 3)
Test sequence V			
Verification of mechanical properties of terminals	8.2.4 (part 1)	20	U3/32 17-24
Verification of degrees of protection of enclosed contactors and starters	ANNEX C (part 1)	---	N/A
Electromagnetic compatibility tests	9.4	---	N/A

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
6.2	MARKING:		
	Data shall be preferably marked on the equipment:		P
	c - number of this standard	IEC 947-4-1	P
	k - IP code, in case of an enclosed equipment	-	N
	Data shall be included on the nameplate, or on the equipment, or in the manufacturer's published literature:		P
	d - rated operational voltages	400V	P
	e – utilization category and rated operational currents (or rated powers), at the rated operational voltages of the equipment	AC3 10A 14A 18A 22A 400V	P
	f - either the value of the rated frequency/ies, or the indication d.c. (or symbol)	50-60Hz	P
	g - rated duty with the indication of the class of intermittent duty, if any		N
	Associated values:		P
	h - rated marking and breaking capacities (these indications may be replaced, where applicable, by the indication of the utilization category)	AC3	P
	Safety an installation:		P
	i - rated insulation voltage	690V	P
	j - rated impulse withstand voltage	8 kV	P
	l – pollution degree	3	P
	m - rated conditional short-circuit current and type of co-ordination of contactor or starter and type, current rating and characteristics of the associated SCPD:		P
	m - rated conditional short-circuit current of the combination starter or the protected starter		N
	n – switching overvoltages	≤ 8 kV	P
	Control circuits: Contactor		P
	The following information concerning control circuits shall be placed either on the coil or on the equipment:		P
	o - rated control circuit voltage (Uc), nature of current and rated frequency	5-550V 50Hz / 6-600V 60Hz 12-220V =	P

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	p - if necessary, nature of current, rated frequency and rated control supply voltages (Us)	Us = Uc	P
	Auxiliary circuits: Overload relay		P
	r - ratings of auxiliary circuits	I _{th} = 3A	P
	Overload relays and releases:		P
	s - characteristics according to 5.7	10A	P
	y – environment 1 or 2	2	P

8.1	CONSTRUCTION: Overload relay		
8.1.1	Materials		P
	Resistance to abnormal heat and fire		P
	-parts retain current-carrying parts: 850 / 960°C	Housing (black)	P
	- other: 650°C	Cover (grey)	P
8.1.2	Current-carrying parts and their connection		P
8.1.3	Clearances		P
	U _{imp} is given as:	8kV	P
	- max. value of rated operational voltage to earth :	600V	—
	- nominal voltage of supply system	400 / 690V	—
	- overvoltage category	IV	—
	- pollution degree	3	—
	- field-in or homogeneous	Inhomogeneous	—
	- minimum clearances (mm)	8	—
	- measured clearances (mm)	> 8	—
	U _{imp} is not given:		N
	- rated insulation voltage U _i (V)		—
	- I _e		—
	- minimum clearances L-L/L-A (mm)		—
	- measured clearances L-L/L-A (mm)		—
	Creepage distances		P
	U _{imp} is given as:	8 kV	P

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	- material group or CTI	Min. III b	—
	- minimum creepage distances (mm)	10	—
	- measured creepage distances (mm)	> 10	—
	Uimp is not given:		N
	- material column a or b		—
	- minimum creepage distances (mm)		—
	- measured creepage distances (mm)		N
8.1.4	Actuator		N
8.1.4.1	Insulation		N
8.1.4.2	Direction		N
8.1.4.3	Mounting		N
8.1.5	Indication of contact position		N
8.1.5.1	Indication means		N
8.1.5.2	Indication by the actuator		N
8.1.6	Additional safety requirements for equipment with isolating function		N
8.1.7	Terminals		P
8.1.7.1	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength	(see 8.2.4 below)	P
	Terminal connections shall be such that necessary contact pressure is maintained	(see 8.2.4 below)	P
	Terminals shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal	(see 8.2.4 below)	P
	Terminal shall not allow the conductor to be displaced or to be displaced themselves in a manner detrimental to the operator of equipment and the insulation voltage shall not be reduced below the rated value	(see 8.2.4 below)	P
8.2.4	Mechanical properties of terminals: Overload Main Terminals		P
8.2.4.2	Mechanical strength of terminals		P

EN 60 947-4-1				
Clause	Requirement – Test	Result - Remark		Verdict
	maximum cross-sectional area of conductor (mm ²)	6 solid	4 flex	—
	diameter of thread (mm)	M3,5		—
	torque (Nm)	0,8		—
	5 times on 2 separate clamping units			P
8.2.4.3	Testing for damage to and accidental loosening of conductor (flexion test)			P
	conductor of the smallest cross-sectional area (mm ²)	2,5 solid	1,5 flex	—
	number of conductor of the smallest cross section	1	1	—
	diameter of bushing hole (mm)	9,5	6,4	—
	height between the equipment and the platen (mm)	279	260	—
	mass at the conductor(s) (kg)	0,7	0,4	—
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit			P
8.2.4.4	Pull-out test			P
	force (N)	50	40	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit			P
	Flexion test			P
	conductor of the largest cross-sectional area (mm ²)	6 solid	4 flex	—
	number of conductor of the largest cross-sectional	1	1	—
	diameter of bushing hole (mm)	9,5	9,5	—
	height between the equipment and the platen (mm)	279	279	—
	mass at the conductor(s) (kg)	1,4	0,9	—

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Pull-out test		P
	force (N)	80 60	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Flexion test		P
	conductor of the largest and smallest cross-sectional area (mm ²)	2,5 // 6 solid 1,5 // 4 flex	—
	number of conductor of the smallest cross sectional, number of conductor of the largest cross sectional	1 // 1 1 // 1	—
	diameter of bushing hole (mm)	9,5 // 9,5 6,4 // 9,5	—
	height between the equipment and the platen (mm)	279 // 279 260 // 279	—
	mass at the conductor(s) (kg)	0,7 // 1,4 0,4 // 0,9	—
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Pull-out test		P
	force (N)	50 // 80 40 // 60	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
8.1.7.2	Connecting capacity		P
	type of conductors	Solid Flex	—
	minimum cross-sectional area of conductor (mm ²)	2,5 1,5	—
	maximum cross-sectional area of conductor (mm ²)	6 4	—
	number of conductors simultaneously connectable to the terminal	2	—

EN 60 947-4-1				
Clause	Requirement – Test	Result - Remark		Verdict
8.2.4	Mechanical properties of terminals Overload Auxiliary Terminals			P
8.2.4.2	Mechanical strength of terminals			P
	maximum cross-sectional area of conductor (mm ²)	2,5 solid	2,5 flex	—
	diameter of thread (mm)	M 3,5		—
	torque (Nm)	0,8		—
	5 times on 2 separate clamping units			P
8.2.4.3	Testing for damage to and accidental loosening of conductor (flexion test)			P
	conductor of the smallest cross-sectional area (mm ²)	1 solid	1 flex	—
	number of conductor of the smallest cross section	1	1	—
	diameter of bushing hole (mm)	6,4	6,4	—
	height between the equipment and the platen (mm)	260	260	—
	mass at the conductor(s) (kg)	0,4	0,4	—
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit			P
8.2.4.4	Pull-out test			P
	force (N)	35	35	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit			P
	Flexion test			P
	conductor of the largest cross-sectional area (mm ²)	2,5 solid	2,5 flex	—
	number of conductor of the largest cross-sectional	1	1	—
	diameter of bushing hole (mm)	9,5	9,5	—
	height between the equipment and the platen (mm)	279	279	—
	mass at the conductor(s) (kg)	0,7	0,7	—

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Pull-out test		P
	force (N)	50 50	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Flexion test		P
	conductor of the largest and smallest cross-sectional area (mm ²)	1 // 2,5 solid 1 // 2,5 flex	—
	number of conductor of the smallest cross sectional, number of conductor of the largest cross sectional	1 // 1 1 // 1	—
	diameter of bushing hole (mm)	6,4 // 9,5 6,4 // 9,5	—
	height between the equipment and the platen (mm)	260 // 279 260 // 279	—
	mass at the conductor(s) (kg)	0,4 // 0,7 0,4 // 0,7	—
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Pull-out test		P
	force (N)	35 // 50 35 // 50	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
8.1.7.2	Connecting capacity		P
	type of conductors	Solid flex	—
	minimum cross-sectional area of conductor (mm ²)	1 1	—
	maximum cross-sectional area of conductor (mm ²)	2,5 2,5	—
	number of conductors simultaneously connectable to the terminal	2	—

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
8.1.7.3	Connection		P
	terminals for connection to external conductors shall be readily accessible during installation		P
	clamping screws and nuts shall not serve to fix any other component		P
8.1.7.4	Terminal identification and marking		P
	terminal intended exclusively for the neutral conductor		N
	protective earth terminal		N
	other terminals		P
	- Main circuit::	2T1, 4T2, 6T3	
	- Auxiliary circuit	95-96, 97-98, 14/22	
8.1.8	Additional requirements for equipment provided with a neutral pole		N
	marking of neutral pole		N
	The switched neutral pole shall not break before and shall not make after the other poles		N
	Conventional thermal current of neutral pole		N
8.1.9	Provisions for protective earthing		N
8.1.9.1	The exposed conductive parts shall be electrically interconnected and connected to a protective earth terminal		N
8.1.9.2	The protective earth terminal shall be readily accessible		N
	The protective earth terminal shall be suitably protected against corrosion		N
	The electrical continuity between the exposed conductive parts of the protective earth terminal and the metal sheathing of connecting conductors		N
	The protective earth terminal shall have no other functions		N

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
8.1.9.3	Protective earth terminal marking and identification		N
8.1.10	Enclosure for equipment		N
8.1.10.1	Design		N
	The enclosure, when it is opened: all parts requiring access for installation and maintenance are readily accessible		N
	Sufficient space shall be provided inside the enclosure		N
	The fixed parts of a metal enclosure shall be electrically connected to the other exposed conductive parts of the equipment and connected to a terminal which enables them to be earthed or connected to a protective conductor		N
	Under no circumstances shall a removable metal part of the enclosure be insulated from the part carrying the earth terminal when the removable part is in place		N
	The removable parts of the enclosure shall be firmly secured to the fixed parts by a device such that they cannot be accidentally loosened or detached owing to the effects of operation of the equipment or vibrations		N
	When an enclosure is so designed as to allow the covers to be opened without the use of tools, means shall be provided to prevent loss of the fastening devices		N
8.1.10.2	Insulation		N

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	If, in order to prevent accidental contact between a metallic enclosure and live parts, the enclosure is partly or completely lined with insulating material, then this lining shall be securely fixed to the enclosure		N
8.1.11	Degree of protection of enclosed equipment		N
	Degree of protection: IP		N
	Test for first characteristic		N
	Test for first numeral:	1: 2: 3: 4: 5: 6:	—
	Test for second characteristic		N
	Test for second numeral:	1: 2: 3: 4: 5: 6: 7: 8:	—

9.3.1.a	TEST SEQUENCE I		
9.3.3.3	Temperature rise		P
	ambient temperature 10-40 °C:	23	—
	Contactor		N
	test enclosure W x H x D (mm x mm x mm)		—
	material of enclosure		—
	Main circuits, test conditions:		N
	- conventional thermal current I _{th} (A)		—

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	- conventional enclosed thermal current I _{the} (A) ..:		—
	- cable/busbar cross-section (mm ²) / (mm)		—
	- temperature rise of main circuit terminals (K)	<	—
	Auxiliary circuit, test conditions:		N
	- rated operation current I _e (A)		—
	- cable cross-section (mm ²)		—
	- temperature rise of auxiliary circuit terminals (K)	<	—
	Coils and electromagnets, test conditions:		P
	- rated control supply voltage U _s (V)	220 – 240 V 50Hz	—
	- Class of insulating material	F	—
	- temperature rise of coil and electromagnets (K) :	< 51	—
	Starter	K3-10A10 230 + U3/32 13-18	P
	test enclosure W x H x D (mm x mm x mm)	-	—
	material of enclosure	-	—
	Main circuits, test conditions:		P
	- conventional thermal current I _{th} (A)	18	—
	- cable/busbar cross-section (mm ²) / (mm)	2,5 mm ²	—
	- temperature rise of main circuit terminals (K)	≤ 57	—
	Overload relay, auxiliary circuit, test conditions:		P
	- rated operation current I _e (A)	3	—
	- cable cross-section (mm ²)	1	—
	- temperature rise of auxiliary circuit terminals (K)	≤ 20	—
	Starter	K3-10A10 230 + U3/32 17-24	P
	test enclosure W x H x D (mm x mm x mm)	-	—
	material of enclosure	-	—
	Main circuits, test conditions:		P
	- conventional thermal current I _{th} (A)	24	—
	- cable/busbar cross-section (mm ²) / (mm)	4 mm ²	—
	- temperature rise of main circuit terminals (K)	≤ 62	—

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	Overload relay, auxiliary circuit, test conditions:		P
	- rated operation current I_e (A)	3	—
	- cable cross-section (mm ²)	1	—
	- temperature rise of auxiliary circuit terminals (K)	≤ 20	—
9.3.3.1	Operation		P
	For starter only:		P
	reference ambient temperature (i.e. + 20 °C)	23°C	—
	rated full load current (A)	0,18 up to 24 A	—
	No tripping after 3 operations when starter has reached thermal equilibrium at minimum and maximum settings		P
	For overload relay with combined stop and reset actuating mechanism only		N
	With closed contactor, the resetting mechanism shall be operated and this shall cause the contactor drop out		N
	For overload relay with either a reset or separate stop and reset mechanism only		P
	With closed contactor and resetting mechanism in the reset position, the tripping mechanism shall be operated and the contactor shall have been caused to drop out		P
9.3.3.2	Operating limits		P
9.3.3.2.1	Power-operated equipment: K3 – 10A... see CB-AT 1285		P
9.3.3.2.2	Relays and releases		P
	Conditions for thermal and time-delay magnetic overload relays only:		P
	type of time-delay overload relay	Thermal, Temp. compensated	—
	trip class	10A	—
	current setting I_{set} :	0,12-0,18 up to 17-24A	—
	ambient temperature (°C)	23	—
	test enclosure W x H x D (mm x mm x mm)	-	—
	cable/busbar cross-section (mm ²) / (mm)	Acc. current setting	—

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current	$I_{set} \times 1,05$ No tripping	—
	When the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current min:sec :	$I_{set} \times 1,2$ 0:12 – 4:24	—
	for class 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current min:sec :	$I_{set} \times 1,5$ 0:06 – 0:45	—
	for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 2, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time	N	—
	at D times the current setting, tripping shall occur within the tripping time (s) $< T_p \leq$, starting from the cold state; test current; tripping time T_p (s) ...:	$I_{set} \times 7,2$ 2,9 – 5,7	—
	Ambient temperature: - 5 °C	P	—
	at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current	$I_{set} \times 1,05$ No tripping	—
	When the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current min:sec :	$I_{set} \times 1,2$ 0:18 – 3:47	—
	for class 10A overlod relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current min:sec :	$I_{set} \times 1,5$ 0:16 – 1:05	—

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 2, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time	N	—
	at D times the current setting, tripping shall occur within the tripping time (s) $< T_p \leq$ starting from the cold state; test current; tripping time T_p (s)	$I_{set} \times 7,2$ 2,9 – 5,7	—
	Ambient temperature: + 40 °C	P	—
	at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current	$I_{set} \times 1,05$ No tripping	—
	When the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current min:sec :	$I_{set} \times 1,2$ 0:09 – 8:50	—
	for class 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current min:sec :	$I_{set} \times 1,5$ 0:04 – 0:50	—
	for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 2, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time	N	—
	at D times the current setting, tripping shall occur within the tripping time (s) $< T_p \leq$ starting from the cold state; test current; tripping time T_p (s)	$I_{set} \times 7,2$ 2,9 – 5,7	—
	Limits of operation of three-pole thermal overload relays energized on two poles:		P
	ambient temperature (°C)	23	—
	the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current :	2 poles $I_{set} \times 1,0$ // 1 pole $\times 0,9$ no tripping	—

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	when the value of the current flowing in two poles is increased to B times the current setting and the third pole deenergized, tripping shall occur in less than 2 h; current value; test current min:sec :	2 poles $I_{set} \times 1,15$ // 1 pole 0 0:52 – 19:25	—
9.3.3.4	Test of dielectric properties, impulse withstand voltage (Uimp indicated):		P
	- verification by measurement of clearances instead of testing	Yes	P
	- rated impulse withstand voltage (V)	8000	—
	- test Uimp main circuits (kV)		N
	- test Uimp auxiliary circuits (kV)		N
	Test of dielectric properties, dielectric withstand voltage:		P
	- rated insulation voltage (V)	690	—
	- main circuits, test voltage for 1 min (V)	2500	P
	- control and auxiliary circuits, test voltage for 1 min (V)	2500	P

9.3.3.5	TEST SEQUENCE II		
	Making and breaking capacity	K3-10A10 230	P
	utilization category	AC3	—
	rated operational voltage Ue (V)	400V	—
	rated operational current Ie (A) or power (kW)	22A / 11kW	—
	Conditions, make/break operations AC-1 only:		N
	- test voltage $U/U_e = 1,05$ (V)	L1: L2: L3:	—
	- test current $I/I_e = 1,5$ (A)	L1: L2: L3:	—
	- power factor/time constant	L1: L2: L3:	—
	- on-time (ms)		—

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	- off-time (s)		—
	- number of make/break operations		N
	Behaviour and condition during and after the test:		N
	- no permanent arcing		N
	- no flash-over between poles		N
	- no blowing of the fusible element in the earth circuit		N
	- no welding of the contacts		N
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N
	Operational performance capability: K3-10A10 230		P
	utilization category (AC-3 or AC-4)	AC3	—
	rated operational voltage Ue (V)	400V	—
	rated operational current Ie (A) or power (kW)	22A / 11kW	—
	Conditions, make operations AC3 only:		P
	- test voltage U/Ue = 1,05 (V)	L1: 424 L2: 424 L3: 424	—
	- test current I/Ie = (A)	L1: 228 L2: 228 L3: 228	—
	- power factor/time constant	L1: 0,44 L2: 0,44 L3: 0,44	—
	- on-time (ms)	500	—
	- off-time (s)	10	—
	- number of make operations	55	P
	Characteristic of transient recovery voltage for AC-3 and AC-4 only:		P
	oscillatory frequency (kHz)	49,1	—

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	Measured oscillatory frequency (kHz)	L1: 49,5 L2: 49,5 L3: 49,5	P
	Factor y	L1: 1,1 L2: 1,1 L3: 1,1	P
	Behaviour and condition during and after the test:		P
	- no permanent arcing		P
	- no flash-over between poles		P
	- no blowing of the fusible element in the earth circuit		P
	- no welding of the contacts		P
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		P
	Operational performance capability:	K3-10A10 230	P
	utilization category	AC3	—
	rated operational voltage Ue (V)	400	—
	rated operational current Ie (A) or power (kW)	22A / 11kW	—
	Conditions, make/break operations AC3 only:		P
	- test voltage U/Ue = 1,05 (V)	L1: 422 L2: 422 L3: 422	—
	- test current I/Ie = (A)	L1: 180 L2: 180 L3: 180	—
	- power factor/time constant	L1: 0,45 L2: 0,45 L3: 0,45	—
	- on-time (ms)	500	—
	- off-time (s)	10	—
	- number of make/break operations	55	P

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	Characteristic of transient recovery voltage for AC-3 and AC-4 only:		P
	oscillatory frequency (kHz)	46,8	—
	Measured oscillatory frequency (kHz)	L1: 47,2 L2: 47,2 L3: 47,2	P
	Factor y	L1: 1,1 L2: 1,1 L3: 1,1	P
	Behaviour and condition during and after the test:		P
	- no permanent arcing		P
	- no flash-over between poles		P
	- no blowing of the fusible element in the earth circuit		P
	- no welding of the contacts		P
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		P
8.3.3.6	Operational performance capability:	K3-10A10 230	P
	utilization category	AC3	—
	rated operational voltage (V)	400	—
	rated operational current I _e (A) or power (kW)	22A / 11kW	—
	Test conditions for make/break operations AC-1 only:		N
	test voltage (V)	L1: L2: L3:	—
	test current (A)	L1: L2: L3:	—
	power factor/time constant	L1: L2: L3:	—
	- on-time (ms)		—

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	- off-time (s)		—
	- number of operating cycles		N
8.3.3.6.6	Behaviour and condition during and after the test:		N
	- no permanent arcing		N
	- no flash-over between poles		N
	- no blowing of the fusible element in the earth circuit		N
	- no welding of the contacts		N
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N
	Dielectric verification:		N
	test voltage (2 Ue + 1000 V) for 1 min (V)		—
8.3.3.6	Operational performance capability: K3-10A10 230		P
	utilization category (AC-3 or AC-4)	AC3	—
	rated operational voltage (V)	400	—
	rated operational current Ie (A) or power (kW)	22A / 11kW	—
	Test conditions for make/break operations AC3 only:		P
	- test voltage (V)	L1: 419 L2: 420 L3: 421	—
	- test current (A)	L1: 45 L2: 45 L3: 45	—
	- power factor/time constant	L1: 0,46 L2: 0,46 L3: 0,46	—
	- on-time (ms)	500	—
	- off-time (s)	4	—
	- number of operating cycles	6000	P
	oscillatory frequency (kHz)	35,3	—
	Characteristic of transient recovery voltage for AC-3 and AC-4 only:		P

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	Measured oscillatory frequency (kHz)	L1: 38,7 L2: 38,7 L3: 38,7	P
	Factor y	L1: 1,1 L2: 1,1 L3: 1,1	P
8.3.3.6.6	Behaviour and condition during and after the test:		P
	- no permanent arcing		P
	- no flash-over between poles		P
	- no blowing of the fusible element in the earth circuit		P
	- no welding of the contacts		P
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		P
	Dielectric verification:		P
	test voltage (2 Ue / min. 1000 V) for 1 min (V) ...:	1380	—

9.3.4	TEST SEQUENCE III		
	Performance under short-circuit conditions		P
9.3.4.2.1	Test at de prospective current "r":	K3-10A + U3/32 0,12-0,18	P
	type of SCPD	Siemens Fuse gL / gG	—
	ratings of SCPD, co-ordination type 1	63A / 500V / 120kA	—
	ratings of SCPD, co-ordination type 2	-	—
	rated operational current Ie (A) AC-3	0,18A	—
	prospective current "r" (kA)	1	—
	test voltage (V)	L1: 422 L2: 422 L3: 422	—
	r.m.s. test current (A)	L1: 1039 L2: 1050 L3: 1056	—

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	peak current (A)	L1: 1472 L2: 1486 L3: 1489	—
	power factor	0,9	P
	1. one breaking operation of SCPD with all the switching devices closed prior to the test I^2dta (A ² s) / peak current I (A)	L1: < 1000 / < 500 L2: < 1000 / < 500 L3: < 1000 / < 500	—
	2. one breaking operation of SCPD by closing the contactor or starter on to the short-circuit I^2dta (A ² s) / peak current I (A)	L1: < 1000 / < 500 L2: < 1000 / < 500 L3: < 1000 / < 500	—
	Behaviour of the equipment during the test		P
	Both types of co-ordination (all devices):		P
	A - the fault current has been successfully interrupted by the SCPD or the combination starter and the fuse or fusible element, or solid connection between the enclosure and supply shall not have melted		P
	B - the door or cover of the enclosure has not been blown open and it is possible to open the door or cover		P
	C - there is no damage to the conductors or terminals and the conductors have not been separated from the terminals		P
	D - there is no cracking or breaking of an insulating base to the extent that the integrity of mounting of a live part is impaired		P
	Both types of co-ordination (combination starters and protected starters only):		N
	E - the circuit breaker or the switch is capable of being opened manually by its operating means		N
	F - neither end of the SCPD is completely separated from its mounting means to an exposed conductive part		N

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	G - if a circuit breaker with rated ultimate short-circuit breaking capacity less than the rated conditional short-circuit current assigned to the combination or protected starter is employed, the circuit breaker shall be tested to trip:		N
	1) circuit breaker with instantaneous trip relays or releases, at 120% of the trip current		N
	2) circuit breaker with overload relays or releases, at 250% of the rated current of the circuit breaker		N
	Type 1 co-ordination (all devices):		P
	H - there has been no discharge of parts beyond the enclosure. The starter may be inoperative after each operation		P
	Type 1 co-ordination (combination and protected starters only):		P
	I - dielectric verification test voltage (2 Ue) for 1 min (V)	1380	—
	Type 2 co-ordination (all devices):		N
	J - no damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts is permitted, if they are easily separated without significant deformation		N
	K - the tripping of the overload relay shall be conform to the published tripping characteristics, before and after the test		N
	L - dielectric verification test voltage (2 Ue) for 1 min (V)		—
9.3.4.2.1	Test at de prospective current "r":	K3-10A + U3/32 10-14	P
	type of SCPD	Siemens Fuse gL / gG	—
	ratings of SCPD, co-ordination type 1	63A / 500V / 120kA	—
	ratings of SCPD, co-ordination type 2	-	—
	rated operational current Ie (A) AC-3	14A	—
	prospective current "r" (kA)	1	—

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Clause	Requirement – Test	Result - Remark	Verdict
	test voltage (V)	L1: 422 L2: 422 L3: 422	—
	r.m.s. test current (A)	L1: 1039 L2: 1050 L3: 1056	—
	peak current (A)	L1: 1472 L2: 1486 L3: 1489	—
	power factor	0,9	P
	1. one breaking operation of SCPD with all the switching devices closed prior to the test I^2dta (A ² s) / peak current I (A)	L1: < 10000 / < 1000 L2: < 10000 / < 1000 L3: < 10000 / < 1000	—
	2. one breaking operation of SCPD by closing the contactor or starter on to the short-circuit I^2dta (A ² s) / peak current I (A)	L1: < 10000 / < 1000 L2: < 10000 / < 1000 L3: < 10000 / < 1000	—
	Behaviour of the equipment during the test		P
	Both types of co-ordination (all devices):		P
	A - the fault current has been successfully interrupted by the SCPD or the combination starter and the fuse or fusible element, or solid connection between the enclosure and supply shall not have melted		P
	B - the door or cover of the enclosure has not been blown open and it is possible to open the door or cover		P
	C - there is no damage to the conductors or terminals and the conductors have not been separated from the terminals		P
	D - there is no cracking or breaking of an insulating base to the extent that the integrity of mounting of a live part is impaired		P

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	Both types of co-ordination (combination starters and protected starters only):		N
	E - the circuit breaker or the switch is capable of being opened manually by its operating means		N
	F - neither end of the SCPD is completely separated from its mounting means to an exposed conductive part		N
	G - if a circuit breaker with rated ultimate short-circuit breaking capacity less than the rated conditional short-circuit current assigned to the combination or protected starter is employed, the circuit breaker shall be tested to trip:		N
	1) circuit breaker with instantaneous trip relays or releases, at 120% of the trip current		N
	2) circuit breaker with overload relays or releases, at 250% of the rated current of the circuit breaker		N
	Type 1 co-ordination (all devices):		P
	H - there has been no discharge of parts beyond the enclosure. The starter may be inoperative after each operation		P
	Type 1 co-ordination (combination and protected starters only):		P
	I - dielectric verification test voltage (2 Ue) for 1 min (V)	1380	—
	Type 2 co-ordination (all devices):		N
	J - no damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts is permitted, if they are easily separated without significant deformation		N
	K - the tripping of the overload relay shall be conform to the published tripping characteristics, before and after the test		N
	L - dielectric verification test voltage (2 Ue) for 1 min (V)		—
9.3.4.2.1	Test at de prospective current "r":	K3-10A + U3/32 13-18	

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	type of SCPD	Siemens Fuse gL / gG	—
	ratings of SCPD, co-ordination type 1	63A / 500V	—
	ratings of SCPD, co-ordination type 2	-	—
	rated operational current I_e (A) AC-3	18A	—
	prospective current "r" (kA)	3	—
	test voltage (V)	L1: 422 L2: 422 L3: 422	—
	r.m.s. test current (A)	L1: 3000 L2: 3033 L3: 3006	—
	peak current (A)	L1: 4321 L2: 4370 L3: 4330	—
	power factor	0,85	P
	1. one breaking operation of SCPD with all the switching devices closed prior to the test I^2dt_a (A ² s) / peak current I (A)	L1: 11760 / 2649 L2: 11320 / 2759 L3: 11010 / 2222	—
	2. one breaking operation of SCPD by closing the contactor or starter on to the short-circuit I^2dt_a (A ² s) / peak current I (A)	L1: 11420 / 2795 L2: 17120 / 2478 L3: 12100 / 2722	—
	Behaviour of the equipment during the test		P
	Both types of co-ordination (all devices):		P
	A - the fault current has been successfully interrupted by the SCPD or the combination starter and the fuse or fusible element, or solid connection between the enclosure and supply shall not have melted		P
	B - the door or cover of the enclosure has not been blown open and it is possible to open the door or cover		P

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Clause	Requirement – Test	Result - Remark	Verdict
	C - there is no damage to the conductors or terminals and the conductors have not been separated from the terminals		P
	D - there is no cracking or breaking of an insulating base to the extent that the integrity of mounting of a live part is impaired		P
	Both types of co-ordination (combination starters and protected starters only):		N
	E - the circuit breaker or the switch is capable of being opened manually by its operating means		N
	F - neither end of the SCPD is completely separated from its mounting means to an exposed conductive part		N
	G - if a circuit breaker with rated ultimate short-circuit breaking capacity less than the rated conditional short-circuit current assigned to the combination or protected starter is employed, the circuit breaker shall be tested to trip:		N
	1) circuit breaker with instantaneous trip relays or releases, at 120% of the trip current		N
	2) circuit breaker with overload relays or releases, at 250% of the rated current of the circuit breaker		N
	Type 1 co-ordination (all devices):		P
	H - there has been no discharge of parts beyond the enclosure. The starter may be inoperative after each operation		P
	Type 1 co-ordination (combination and protected starters only):		P
	I - dielectric verification test voltage (2 Ue) for 1 min (V)	1380	—
	Type 2 co-ordination (all devices):		N
	J - no damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts is permitted, if they are easily separated without significant deformation		N

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Clause	Requirement – Test	Result - Remark	Verdict
	K - the tripping of the overload relay shall be conform to the published tripping characteristics, before and after the test		N
	L - dielectric verification test voltage (2 Ue) for 1 min (V)		—
9.3.4.2.1	Test at de prospective current "r":	K3-10A + U3/32 17-24	
	type of SCPD	Siemens Fuse gL / gG	—
	ratings of SCPD, co-ordination type 1	63A / 500V	—
	ratings of SCPD, co-ordination type 2	-	—
	rated operational current Ie (A) AC-3	22A	—
	prospective current "r" (kA)	3	—
	test voltage (V)	L1: 422 L2: 422 L3: 422	—
	r.m.s. test current (A)	L1: 3000 L2: 3033 L3: 3006	—
	peak current (A)	L1: 4321 L2: 4370 L3: 4330	—
	power factor	0,85	P
	1. one breaking operation of SCPD with all the switching devices closed prior to the test I ² dta (A ² s) / peak current I (A)	L1: 11634 / 2686 L2: 11148 / 2808 L3: 10781 / 2283	—
	2. one breaking operation of SCPD by closing the contactor or starter on to the short-circuit I ² dta (A ² s) / peak current I (A)	L1: 11235 / 2771 L2: 13247 / 2795 L3: 11204 / 2649	—
	Behaviour of the equipment during the test		P
	Both types of co-ordination (all devices):		P

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	A - the fault current has been successfully interrupted by the SCPD or the combination starter and the fuse or fusible element, or solid connection between the enclosure and supply shall not have melted		P
	B - the door or cover of the enclosure has not been blown open and it is possible to open the door or cover		P
	C - there is no damage to the conductors or terminals and the conductors have not been separated from the terminals		P
	D - there is no cracking or breaking of an insulating base to the extent that the integrity of mounting of a live part is impaired		P
	Both types of co-ordination (combination starters and protected starters only):		N
	E - the circuit breaker or the switch is capable of being opened manually by its operating means		N
	F - neither end of the SCPD is completely separated from its mounting means to an exposed conductive part		N
	G - if a circuit breaker with rated ultimate short-circuit breaking capacity less than the rated conditional short-circuit current assigned to the combination or protected starter is employed, the circuit breaker shall be tested to trip:		N
	1) circuit breaker with instantaneous trip relays or releases, at 120% of the trip current		N
	2) circuit breaker with overload relays or releases, at 250% of the rated current of the circuit breaker		N
	Type 1 co-ordination (all devices):		P
	H - there has been no discharge of parts beyond the enclosure. The starter may be inoperative after each operation		P

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	Type 1 co-ordination (combination and protected starters only):		P
	I - dielectric verification test voltage (2 Ue) for 1 min (V)	1380	—
	Type 2 co-ordination (all devices):		N
	J - no damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts is permitted, if they are easily separated without significant deformation		N
	K - the tripping of the overload relay shall be conform to the published tripping characteristics, before and after the test		N
	L - dielectric verification test voltage (2 Ue) for 1 min (V)		—
9.3.4.2.2	Test at the rated conditional short-circuit current "I _q " < "r"		N

9.3.5	TEST SEQUENCE IV: (APPLICABLE FOR CONTACTORS ONLY)		
	Overload current withstand capability of contactors: K3-10A10 230		P
	ambient temperature (°C)	23	—
	rated operational current I _e (A) max. AC-3	22	—
	test current (I _e) (A)	176	—
	duration of test: 10 s	10s	—
	After the test, the contactor shall be substantially in the same condition as before the test (visual inspection)		P

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict

TABLE: temperature rise measurements			
temperature rise dT of part:	No.	dT (K)	Required dT (K)
Main Terminals Contactor K3-10A (18A)	1	37	65
	3	43	65
	5	42	65
Auxiliary Terminals Contactor K3-10A (10A)	13	34	65
Main Terminal Overload Relay U3/32 18 (18A)	2	48	65
	4	57	65
	6	51	65
Auxiliary Terminal Overload Relay (3A)	95	18	65
	96	20	65
Overload Relay Terminal Connection (10A)	14	30	65
Main Terminals Contactor K3-10A (24A)	1	39	65
	3	45	65
	5	43	65
Auxiliary Terminals Contactor K3-10A (10A)	13	46	65
Main Terminal Overload Relay U3/32 24 (24A)	2	51	65
	4	62	65
	6	59	65
Auxiliary Terminal Overload Relay (3A)	95	18	65
	96	20	65
Overload Relay Terminal Connection (16A)	14	30	65

Remarks

TEST REPORT

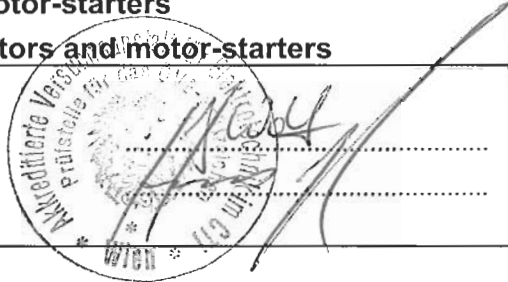
IEC 60 947-4-1

Low-voltage switchgear and controlgear

Part 4: Contactors and motor-starters

Section 1: Electromechanical contactors and motor-starters


Report reference No. :	CTI – CB 479-2
Tested by (+ signature)	J.Wolf
Approved by (+ signature)	Ing. H.Bachl
Date of issue.....	26.03.2003
Testing laboratory	CTI-Vienna
Address.....	A – 1210 Vienna, Einzingerasse 4
Testing location	as above
Applicant	Benedict GmbH
Address.....	A – 1220 Vienna, Liebgasse 7
Standard	IEC 60 947-4-1:1990 + A1:1994 + A2:1996
Test Report Form No.....	69474-1A
Master TRF.....	reference No. 69474-1A, dated 95-07
Copyright blank test report	the bodies participating in the Committee of Certification Bodies (CCB) and/or the CENELEC Certification Agreement (CCA).
Test procedure	CB-scheme
Procedure deviation.....	---
Non-standard test method	---
Type of test object	Motor-starter
Trademark	Ω, Benedikt & Jäger
Model/type reference.....	K3-24A... + U3/32... K3-32A... + U3/32... K3-40A... + U3/32...
Manufacturer	Benedict GmbH, A – 1220 Vienna, Liebgasse 7
Rating	24A , 32A, 40A (400V 50-60Hz)




TRF No.: 69474-1A

Copy of marking plate

Contactor K3-24A

IEC/EN 60947-4-1 AS3947-4-1
 VDE0660 AC1=I_b 50A 690V~
 AC3 400V **24A** 
 AC2, AC3

V~	220	240	380	415	500
kW	6	7	11	12	15


LISTED IND. CONT.
 EQUIP. 93B2
 **us** 600V ac 50amp A600
 v | 115 | 200 | 230 | 460 | 575

3ph hp	3	5	7,5	15	20
1ph 2p hp	1,5	3	3	7,5	10


TORQUE 1.8Nm / 16lb.-inch
 14AWG-4AWG
 Cu wire min. 60.75°C only
 Made in Austria

SUITABLE FOR USE ON A CIRCUIT
 CAPABLE OF DELIVERING NOT MORE
 THAN 5000 RMS SYMMETRICAL AMPS
 600 VOLTS MAX. WHEN PROTECTED
 BY A FUSE RATED 90 AMP

K3-32A

IEC/EN 60947-4-1 AS3947-4-1
 VDE0660 AC1=I_b 65A 690V~
 AC3 400V **32A** 
 AC2, AC3

V~	220	240	380	415	500
kW	8,5	9	15	16	18,5


LISTED IND. CONT.
 EQUIP. 93B2
 **us** 600V ac 65amp A600
 v | 115 | 200 | 230 | 460 | 575

3ph hp	5	7,5	10	20	25
1ph 2p hp	2	5	5	10	15


TORQUE 1.8Nm / 16lb.-inch
 14AWG-4AWG
 Cu wire min. 60.75°C only
 Made in Austria

SUITABLE FOR USE ON A CIRCUIT
 CAPABLE OF DELIVERING NOT MORE
 THAN 5000 RMS SYMMETRICAL AMPS
 600 VOLTS MAX. WHEN PROTECTED
 BY A FUSE RATED 125 AMP

K3-40A

IEC/EN 60947-4-1 AS3947-4-1
 VDE0660 AC1=I_b 80A 690V~
 AC3 400V **40A** 
 AC2, AC3

V~	220	240	380	415	500
kW	11	11,5	18,5	20	18,5

LISTED IND. CONT.
 EQUIP. 93B2
 **us** 600V ac 80amp A600
 v | 115 | 200 | 230 | 460 | 575

3ph hp	7,5	10	15	25	30
1ph 2p hp	3	7,5	7,5	15	20

TORQUE 1.8Nm / 16lb.-inch
 14AWG-4AWG
 Cu wire min. 60.75°C only
 Made in Austria

SUITABLE FOR USE ON A CIRCUIT
 CAPABLE OF DELIVERING NOT MORE
 THAN 5000 RMS SYMMETRICAL AMPS
 600 VOLTS MAX. WHEN PROTECTED
 BY A FUSE RATED 175 AMP

Overload Relay U3/32

 **BENEDIKT & JÄGER U3/32 18** 

IEC/EN 60947 VDE0660 690V~
 Auslöseklasse / Trip class: 18A
13-18A

Typ 1" GL (g) 63A
 Typ 2" GL (g) 32A

ACT5 | A
 24V | 3
 230V | 2
 400V | 1

STOP
 R (TEST)

95 97
 95 97
 95 97

LISTED IND. CONT. EQ. 93B3
 600V ac

95 97
 95 97
 95 97

Max. fuse size **50A**

Suitable for use on a circuit capable of delivering not more than 50A rms, sym. amps 600V max. Amb. compensated Phase failure sensitive type. Numbers on dial are full load motor currents. Tripping current is 125% of numbers on dial. Tightening torque 8,1 lb.-in.
 14 AWG - 10 AWG Wire 60°C Cu only
 Made in Austria

 **BENEDIKT & JÄGER U3/32 32** 

IEC/EN 60947 VDE0660 690V~
 Auslöseklasse / Trip class: 18A
23-32A

Typ 1" GL (g) 80A
 Typ 2" GL (g) 63A

ACT5 | A
 24V | 3
 230V | 2
 400V | 1

STOP
 R (TEST)

95 97
 95 97
 95 97

LISTED IND. CONT. EQ. 93B3
 600V ac

95 97
 95 97
 95 97

Max. fuse size **70A**

Suitable for use on a circuit capable of delivering not more than 50A rms, sym. amps 600V max. Amb. compensated Phase failure sensitive type. Numbers on dial are full load motor currents. Tripping current is 125% of numbers on dial. Tightening torque 8,1 lb.-in.
 14 AWG - 10 AWG Wire 60°C Cu only
 Made in Austria

Photo:



TRF No.: 69474-1A

Test item particulars:

- method of operation : Magnetic
- switching positions : ON-OFF
- number of poles.....Contactors: 3 Main
- kind of current..... : AC
- number of phases..... : 3
- rated frequency (Hz)..... : 50-60
- number of positions of main contacts..... : 2
- Rated and limiting values, main circuit..... :
- rated operational voltage U_e (V) : 400
- rated insulation voltage U_i (V) : 690
- rated impulse withstand voltage U_{imp} (kV)..... : 8
- conventional free air thermal current I_{th} (A)..... : 50 65 80
- conventional enclosed thermal current I_{the} (A) : -
- rated operational current I_e (A) : 24 32 40
- rated uninterrupted I_u (A) : 24 32 40
- utilization category..... : AC3
- Short-circuit characteristic :
- rated prospective short-circuit current "r" (kA) : 3
- rated conditional short-circuit current I_q (kA) : 3
- Rated and limiting values, auxiliary circuits..... :
- rated operational voltage (V)..... : -
- rated frequency (Hz)..... : -
- number of circuits : -
- number and kind of contact elements : -
- Co-ordination of short-circuit protective devices : Type "1"
- kind of protective device..... : Fuse 63A gL/gG up to 24A, 100A gL/gG up to 32A

Possible test case verdicts:

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

General remarks:

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IEC 60384-1-2.

"(see remark #)" refers to a remark appended to the report.

"(see appended table)" refers to a table appended to the report.

Throughout this report a comma is used as the decimal separator.

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 testing laboratory.

1. **The Contactor K3-24A... used as part of the motorstarter is covered in CB-AT 1285 / CTI-CB 428-2 (utilization category AC 1) dated 2001-12-03.**
2. **All tests have been performed with K3-24A (= smallest size) contactors with ratings of K3-40A (=biggest size) contactors.**
3. **Test sequences I, II, IV and V have been tested by CTI - staff at manufacturer premises (partly TMP)**
4. **This report also covers the requirements of IEC 60947-4-1:2000-11.**

Ordering key:

Contacteur

K3-24A xxx ... see CB-AT 1285

Overload Relay

U3/32 x

I I >>>> : Setting range 0,12 – 0,18 / 0,18 – 0,27 / 0,27 – 0,4 / 0,4 – 0,6 /

I 0,6 – 0,9 / 0,8 – 1,2 / 1,2 – 1,8 / 1,8 – 2,7 /

I 2,7 – 4 / 4 – 6 / 6 – 9 / 8 – 11 / 10 – 14 /

I 13 – 18 / 17 – 24 / 23 – 32

I

I >>>>>>>> : Type number

Test	Sub – clause No.	Sample	Motor - starter
Test sequence I			
Verification of temperature - rise	9.3.3.3	1	K3 – 24A00 230 + U3/32 23-32
Verification of operation and operating limits	9.3.3.1 and 9.3.3.2	1	K3 – 24A00 230 + U3/32 23-32
Verification of dielectric properties	9.3.3.4	1	K3 – 24A00 230 + U3/32 23-32
Test sequence II			
Verification of rated making and breaking capacities, change – over ability and reversibility	9.3.3.5	2	K3 – 24A00 230 (AC 3)
Verification of conventional operational performance	9.3.3.6	2	K3 – 24A00 230 (AC 3)
Test sequence III			
Performance under short – circuit conditions	9.3.4	3	K3 – 24A00 230 + U3/32 23-32
Test sequence IV			
Verification of ability to withstand overload currents	9.3.5	4	K3 – 24A00 230 (AC 3)
Test sequence V			
Verification of mechanical properties of terminals	8.2.4 (part 1)	5	U3/32 23-32
Verification of degrees of protection of enclosed contactors and starters	ANNEX C (part 1)	---	N/A
Electromagnetic compatibility tests	9.4	---	N/A

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
6.2	MARKING:		
	Data shall be preferably marked on the equipment:		P
	c - number of this standard	IEC 947-4-1	P
	k - IP code, in case of an enclosed equipment	-	N
	Data shall be included on the nameplate, or on the equipment, or in the manufacturer's published literature:		P
	d - rated operational voltages	400V	P
	e – utilization category and rated operational currents (or rated powers), at the rated operational voltages of the equipment	AC3 24A 32A 40A 400V	P
	f - either the value of the rated frequency/ies, or the indication d.c. (or symbol)	50-60Hz	P
	g - rated duty with the indication of the class of intermittent duty, if any		N
	Associated values:		P
	h - rated marking and breaking capacities (these indications may be replaced, where applicable, by the indication of the utilization category)	AC3	P
	Safety an installation:		P
	i - rated insulation voltage	690V	P
	j - rated impulse withstand voltage	8 kV	P
	l – pollution degree	3	P
	m - rated conditional short-circuit current and type of co-ordination of contactor or starter and type, current rating and characteristics of the associated SCPD:		P
	m - rated conditional short-circuit current of the combination starter or the protected starter		N
	n – switching overvoltages	≤ 8 kV	P
	Control circuits: Contactor		P
	The following information concerning control circuits shall be placed either on the coil or on the equipment:		P
	o - rated control circuit voltage (Uc), nature of current and rated frequency	5-550V 50Hz / 6-600V 60Hz 12-220V =	P

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	p - if necessary, nature of current, rated frequency and rated control supply voltages (Us)	Us = Uc	P
	Auxiliary circuits: Overload relay		P
	r - ratings of auxiliary circuits	I _{th} = 3A	P
	Overload relays and releases:		P
	s - characteristics according to 5.7	10A	P
	y – environment 1 or 2	2	P

8.1	CONSTRUCTION: Overload relay		
8.1.1	Materials		P
	Resistance to abnormal heat and fire		P
	-parts retain current-carrying parts: 850 / 960°C	Housing (black)	P
	- other: 650°C	Cover (grey)	P
8.1.2	Current-carrying parts and their connection		P
8.1.3	Clearances		P
	U _{imp} is given as:	8kV	P
	- max. value of rated operational voltage to earth :	600V	—
	- nominal voltage of supply system	400 / 690V	—
	- overvoltage category	IV	—
	- pollution degree	3	—
	- field-in or homogeneous	Inhomogeneous	—
	- minimum clearances (mm)	8	—
	- measured clearances (mm)	> 8	—
	U _{imp} is not given:		N
	- rated insulation voltage U _i (V)		—
	- I _e		—
	- minimum clearances L-L/L-A (mm)		—
	- measured clearances L-L/L-A (mm)		—
	Creepage distances		P
	U _{imp} is given as:	8 kV	P

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	- material group or CTI	Min. III b	—
	- minimum creepage distances (mm)	10	—
	- measured creepage distances (mm)	> 10	—
	Uimp is not given:		N
	- material column a or b		—
	- minimum creepage distances (mm)		—
	- measured creepage distances (mm)		N
8.1.4	Actuator		N
8.1.4.1	Insulation		N
8.1.4.2	Direction		N
8.1.4.3	Mounting		N
8.1.5	Indication of contact position		N
8.1.5.1	Indication means		N
8.1.5.2	Indication by the actuator		N
8.1.6	Additional safety requirements for equipment with isolating function		N
8.1.7	Terminals		P
8.1.7.1	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength	(see 8.2.4 below)	P
	Terminal connections shall be such that necessary contact pressure is maintained	(see 8.2.4 below)	P
	Terminals shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal	(see 8.2.4 below)	P
	Terminal shall not allow the conductor to be displaced or to be displaced themselves in a manner detrimental to the operator of equipment and the insulation voltage shall not be reduced below the rated value	(see 8.2.4 below)	P
8.2.4	Mechanical properties of terminals: Overload Main Terminals		P
8.2.4.2	Mechanical strength of terminals		P

EN 60 947-4-1				
Clause	Requirement – Test	Result - Remark		Verdict
	maximum cross-sectional area of conductor (mm ²)	6 solid	4 flex	—
	diameter of thread (mm)	M3,5		—
	torque (Nm)	0,8		—
	5 times on 2 separate clamping units			P
8.2.4.3	Testing for damage to and accidental loosening of conductor (flexion test)			P
	conductor of the smallest cross-sectional area (mm ²)	2,5 solid	1,5 flex	—
	number of conductor of the smallest cross section	1	1	—
	diameter of bushing hole (mm)	9,5	6,4	—
	height between the equipment and the platen (mm)	279	260	—
	mass at the conductor(s) (kg)	0,7	0,4	—
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit			P
8.2.4.4	Pull-out test			P
	force (N)	50	40	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit			P
	Flexion test			P
	conductor of the largest cross-sectional area (mm ²)	6 solid	4 flex	—
	number of conductor of the largest cross-sectional	1	1	—
	diameter of bushing hole (mm)	9,5	9,5	—
	height between the equipment and the platen (mm)	279	279	—
	mass at the conductor(s) (kg)	1,4	0,9	—

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Pull-out test		P
	force (N)	80 60	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Flexion test		P
	conductor of the largest and smallest cross-sectional area (mm ²)	2,5 // 6 solid 1,5 // 4 flex	—
	number of conductor of the smallest cross sectional, number of conductor of the largest cross sectional	1 // 1 1 // 1	—
	diameter of bushing hole (mm)	9,5 // 9,5 6,4 // 9,5	—
	height between the equipment and the platen (mm)	279 // 279 260 // 279	—
	mass at the conductor(s) (kg)	0,7 // 1,4 0,4 // 0,9	—
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Pull-out test		P
	force (N)	50 // 80 40 // 60	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
8.1.7.2	Connecting capacity		P
	type of conductors	Solid Flex	—
	minimum cross-sectional area of conductor (mm ²)	2,5 1,5	—
	maximum cross-sectional area of conductor (mm ²)	6 4	—
	number of conductors simultaneously connectable to the terminal	2	—

EN 60 947-4-1				
Clause	Requirement – Test	Result - Remark		Verdict
8.2.4	Mechanical properties of terminals Overload Auxiliary Terminals			P
8.2.4.2	Mechanical strength of terminals			P
	maximum cross-sectional area of conductor (mm ²)	2,5 solid	2,5 flex	—
	diameter of thread (mm)	M 3,5		—
	torque (Nm)	0,8		—
	5 times on 2 separate clamping units			P
8.2.4.3	Testing for damage to and accidental loosening of conductor (flexion test)			P
	conductor of the smallest cross-sectional area (mm ²)	1 solid	1 flex	—
	number of conductor of the smallest cross section	1	1	—
	diameter of bushing hole (mm)	6,4	6,4	—
	height between the equipment and the platen (mm)	260	260	—
	mass at the conductor(s) (kg)	0,4	0,4	—
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit			P
8.2.4.4	Pull-out test			P
	force (N)	35	35	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit			P
	Flexion test			P
	conductor of the largest cross-sectional area (mm ²)	2,5 solid	2,5 flex	—
	number of conductor of the largest cross-sectional	1	1	—
	diameter of bushing hole (mm)	9,5	9,5	—
	height between the equipment and the platen (mm)	279	279	—
	mass at the conductor(s) (kg)	0,7	0,7	—

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
8.1.7.3	Connection		P
	terminals for connection to external conductors shall be readily accessible during installation		P
	clamping screws and nuts shall not serve to fix any other component		P
8.1.7.4	Terminal identification and marking		P
	terminal intended exclusively for the neutral conductor		N
	protective earth terminal		N
	other terminals		P
	- Main circuit::	2T1, 4T2, 6T3	
	- Auxiliary circuit	95-96, 97-98, 14/22	
8.1.8	Additional requirements for equipment provided with a neutral pole		N
	marking of neutral pole		N
	The switched neutral pole shall not break before and shall not make after the other poles		N
	Conventional thermal current of neutral pole		N
8.1.9	Provisions for protective earthing		N
8.1.9.1	The exposed conductive parts shall be electrically interconnected and connected to a protective earth terminal		N
8.1.9.2	The protective earth terminal shall be readily accessible		N
	The protective earth terminal shall be suitably protected against corrosion		N
	The electrical continuity between the exposed conductive parts of the protective earth terminal and the metal sheathing of connecting conductors		N
	The protective earth terminal shall have no other functions		N

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
8.1.9.3	Protective earth terminal marking and identification		N
8.1.10	Enclosure for equipment		N
8.1.10.1	Design		N
	The enclosure, when it is opened: all parts requiring access for installation and maintenance are readily accessible		N
	Sufficient space shall be provided inside the enclosure		N
	The fixed parts of a metal enclosure shall be electrically connected to the other exposed conductive parts of the equipment and connected to a terminal which enables them to be earthed or connected to a protective conductor		N
	Under no circumstances shall a removable metal part of the enclosure be insulated from the part carrying the earth terminal when the removable part is in place		N
	The removable parts of the enclosure shall be firmly secured to the fixed parts by a device such that they cannot be accidentally loosened or detached owing to the effects of operation of the equipment or vibrations		N
	When an enclosure is so designed as to allow the covers to be opened without the use of tools, means shall be provided to prevent loss of the fastening devices		N
8.1.10.2	Insulation		N

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	If, in order to prevent accidental contact between a metallic enclosure and live parts, the enclosure is partly or completely lined with insulating material, then this lining shall be securely fixed to the enclosure		N
8.1.11	Degree of protection of enclosed equipment		N
	Degree of protection	IP	N
	Test for first characteristic		N
	Test for first numeral	1: 2: 3: 4: 5: 6:	—
	Test for second characteristic		N
	Test for second numeral	1: 2: 3: 4: 5: 6: 7: 8:	—

9.3.1.a	TEST SEQUENCE I		
9.3.3.3	Temperature rise		P
	ambient temperature 10-40 °C	23	—
	Contactor		N
	test enclosure W x H x D (mm x mm x mm)		—
	material of enclosure		—
	Main circuits, test conditions:		N
	- conventional thermal current Ith (A)		—

EN 60 947-4-1			
Clause	Requirement – Test	Result - Remark	Verdict
	- conventional enclosed thermal current I_{the} (A) ..:		—
	- cable/busbar cross-section (mm ²) / (mm)		—
	- temperature rise of main circuit terminals (K)	<	—
	Auxiliary circuit, test conditions:		N
	- rated operation current I_e (A)		—
	- cable cross-section (mm ²)		—
	- temperature rise of auxiliary circuit terminals (K)	<	—
	Coils and electromagnets, test conditions:		P
	- rated control supply voltage U_s (V)	220 – 240 V 50Hz	—
	- Class of insulating material	F	—
	- temperature rise of coil and electromagnets (K) :	< 57	—
	Starter	K3-24A00 230 + U3/32 23-32	P
	test enclosure W x H x D (mm x mm x mm)	-	—
	material of enclosure	-	—
	Main circuits, test conditions:		P
	- conventional thermal current I_{th} (A)	32	—
	- cable/busbar cross-section (mm ²) / (mm)	6 mm ²	—
	- temperature rise of main circuit terminals (K)	≤ 55	—
	Overload relay, auxiliary circuit, test conditions:		P
	- rated operation current I_e (A)	3	—
	- cable cross-section (mm ²)	1	—
	- temperature rise of auxiliary circuit terminals (K)	≤ 20	—
9.3.3.1	Operation		P
	For starter only:		P
	reference ambient temperature (i.e. + 20 °C)	23°C	—
	rated full load current (A)	24 up to 32 A	—
	No tripping after 3 operations when starter has reached thermal equilibrium at minimum and maximum settings		P
	For overload relay with combined stop and reset actuating mechanism only		N

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Clause	Requirement – Test	Result - Remark	Verdict
	With closed contactor, the resetting mechanism shall be operated and this shall cause the contactor drop out		N
	For overload relay with either a reset or separate stop and reset mechanism only		P
	With closed contactor and resetting mechanism in the reset position, the tripping mechanism shall be operated and the contactor shall have been caused to drop out	P	P
9.3.3.2	Operating limits		P
9.3.3.2.1	Power-operated equipment: K3 – 24A... see CB-AT1285		P
9.3.3.2.2	Relays and releases		P
	Conditions for thermal and time-delay magnetic overload relays only:		P
	type of time-delay overload relay	Thermal, Temp. compensated	—
	trip class	10A	—
	current setting I_{set} :	23-32A	—
	ambient temperature (°C)	23	—
	test enclosure W x H x D (mm x mm x mm)	-	—
	cable/busbar cross-section (mm ²) / (mm)	Acc. current setting	—
	at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current	$I_{set} \times 1,05$ No tripping	—
	When the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current min:sec :	$I_{set} \times 1,2$ 0:12 – 0:29	—
	for class 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current min:sec :	$I_{set} \times 1,5$ 0:06 – 0:22	—

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Clause	Requirement – Test	Result - Remark	Verdict
	for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 2, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time	N	—
	at D times the current setting, tripping shall occur within the tripping time (s) $< T_p \leq$, starting from the cold state; test current; tripping time T_p (s)	$I_{set} \times 7,2$ 2,9 – 3,7	—
	Ambient temperature: - 5 °C	P	—
	at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current	$I_{set} \times 1,05$ No tripping	—
	When the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current min:sec :	$I_{set} \times 1,2$ 1:48 – 2:04	—
	for class 10A overlo relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current min:sec :	$I_{set} \times 1,5$ 0:23 – 0:29	—
	for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 2, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time	N	—
	at D times the current setting, tripping shall occur within the tripping time (s) $< T_p \leq$ starting from the cold state; test current; tripping time T_p (s)	$I_{set} \times 7,2$ 2,9 – 3,7	—
	Ambient temperature: + 40 °C	P	—
	at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current	$I_{set} \times 1,05$ No tripping	—

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Clause	Requirement – Test	Result - Remark	Verdict
	When the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current min:sec :	$I_{set} \times 1,2$ 0:09 – 0:19	—
	for class 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current min:sec :	$I_{set} \times 1,5$ 0:04 – 0:08	—
	for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 2, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time	N	—
	at D times the current setting, tripping shall occur within the tripping time (s) $< T_p \leq$ starting from the cold state; test current; tripping time T_p (s)	$I_{set} \times 7,2$ 2,9 – 3,7	—
	Limits of operation of three-pole thermal overload relays energized on two poles:		P
	ambient temperature (°C)	23	—
	the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current :	2 poles $I_{set} \times 1,0$ // 1 pole $\times 0,9$ no tripping	—
	when the value of the current flowing in two poles is increased to B times the current setting and the third pole deenergized, tripping shall occur in less than 2 h; current value; test current min:sec :	2 poles $I_{set} \times 1,15$ // 1 pole 0 3:22 – 7:59	—
9.3.3.4	Test of dielectric properties, impulse withstand voltage (U_{imp} indicated):		P
	- verification by measurement of clearances instead of testing	Yes	P
	- rated impulse withstand voltage (V)	8000	—
	- test U_{imp} main circuits (kV)		N
	- test U_{imp} auxiliary circuits (kV)		N
	Test of dielectric properties, dielectric withstand voltage:		P
	- rated insulation voltage (V)	690	—

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Clause	Requirement – Test	Result - Remark	Verdict

	- main circuits, test voltage for 1 min (V)	2500	P
	- control and auxiliary circuits, test voltage for 1 min (V)	2500	P

9.3.3.5	TEST SEQUENCE II		
	Making and breaking capacity	K3 - 24A00 230	P
	utilization category	AC3	—
	rated operational voltage Ue (V)	400V	—
	rated operational current Ie (A) or power (kW)	40A / 18,5kW	—
	Conditions, make/break operations AC-1 only:		N
	- test voltage U/Ue = 1,05 (V)	L1: L2: L3:	—
	- test current I/Ie = 1,5 (A)	L1: L2: L3:	—
	- power factor/time constant	L1: L2: L3:	—
	- on-time (ms)		—
	- off-time (s)		—
	- number of make/break operations		N
	Behaviour and condition during and after the test:		N
	- no permanent arcing		N
	- no flash-over between poles		N
	- no blowing of the fusible element in the earth circuit		N
	- no welding of the contacts		N
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N
	Operational performance capability:	K3 - 24A00 230	P

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Clause	Requirement – Test	Result - Remark	Verdict
	utilization category (AC-3 or AC-4)	AC3	—
	rated operational voltage U_e (V)	400V	—
	rated operational current I_e (A) or power (kW)	40A / 18,5kW	—
	Conditions, make operations AC3 only:		P
	- test voltage $U/U_e = 1,05$ (V)	L1: 425 L2: 425 L3: 425	—
	- test current $I/I_e =$ (A)	L1: 415 L2: 415 L3: 415	—
	- power factor/time constant	L1: 0,44 L2: 0,44 L3: 0,44	—
	- on-time (ms)	500	—
	- off-time (s)	10	—
	- number of make operations	55	P
	Characteristic of transient recovery voltage for AC-3 and AC-4 only:		P
	oscillatory frequency (kHz)	55,3	—
	Measured oscillatory frequency (kHz)	L1: 53,5 L2: 53,5 L3: 53,5	P
	Factor γ	L1: 1,1 L2: 1,1 L3: 1,1	P
	Behaviour and condition during and after the test:		P
	- no permanent arcing		P
	- no flash-over between poles		P
	- no blowing of the fusible element in the earth circuit		P
	- no welding of the contacts		P

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Clause	Requirement – Test	Result - Remark	Verdict
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		P
	Operational performance capability:	K3 - 24A00 230	P
	utilization category	AC3	—
	rated operational voltage Ue (V)	400	—
	rated operational current Ie (A) or power (kW)	40A / 18,5kW	—
	Conditions, make/break operations AC3 only:		P
	- test voltage U/Ue = 1,05 (V)	L1: 422 L2: 422 L3: 422	—
	- test current I/Ie = (A)	L1: 325 L2: 325 L3: 325	—
	- power factor/time constant	L1: 0,35 L2: 0,35 L3: 0,35	—
	- on-time (ms)	500	—
	- off-time (s)	10	—
	- number of make/break operations	55	P
	Characteristic of transient recovery voltage for AC-3 and AC-4 only:		P
	oscillatory frequency (kHz)	50,7	—
	Measured oscillatory frequency (kHz)	L1: 52,4 L2: 52,4 L3: 52,4	P
	Factor y	L1: 1,1 L2: 1,1 L3: 1,1	P
	Behaviour and condition during and after the test:		P
	- no permanent arcing		P
	- no flash-over between poles		P

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Clause	Requirement – Test	Result - Remark	Verdict
	- no blowing of the fusible element in the earth circuit	P	P
	- no welding of the contacts	P	P
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control	P	P
8.3.3.6	Operational performance capability:	K3 - 24A00 230	P
	utilization category	AC3	—
	rated operational voltage (V)	400	—
	rated operational current Ie (A) or power (kW)	40A / 18,5kW	—
	Test conditions for make/break operations AC-1 only:		N
	test voltage (V)	L1: L2: L3:	—
	test current (A)	L1: L2: L3:	—
	power factor/time constant	L1: L2: L3:	—
	- on-time (ms)		—
	- off-time (s)		—
	- number of operating cycles		N
8.3.3.6.6	Behaviour and condition during and after the test:		N
	- no permanent arcing		N
	- no flash-over between poles		N
	- no blowing of the fusible element in the earth circuit		N
	- no welding of the contacts		N
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N

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Clause	Requirement – Test	Result - Remark	Verdict
	Dielectric verification:		N
	test voltage (2 Ue + 1000 V) for 1 min (V)		—
8.3.3.6	Operational performance capability:	K3-24A00 230	P
	utilization category (AC-3 or AC-4)	AC3	—
	rated operational voltage (V)	400	—
	rated operational current Ie (A) or power (kW)	40A / 18,5kW	—
	Test conditions for make/break operations AC3 only:		P
	- test voltage (V)	L1: 422 L2: 422 L3: 422	—
	- test current (A)	L1: 82 L2: 82 L3: 82	—
	- power factor/time constant	L1: 0,48 L2: 0,48 L3: 0,48	—
	- on-time (ms)	500	—
	- off-time (s)	4	—
	- number of operating cycles	6000	P
	oscillatory frequency (kHz)	40,0	—
	Characteristic of transient recovery voltage for AC-3 and AC-4 only:		P
	Measured oscillatory frequency (kHz)	L1: 45,0 L2: 45,0 L3: 45,0	P
	Factor y	L1: 1,1 L2: 1,1 L3: 1,1	P
8.3.3.6.6	Behaviour and condition during and after the test:		P
	- no permanent arcing		P
	- no flash-over between poles		P
	- no blowing of the fusible element in the earth circuit		P

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Clause	Requirement – Test	Result - Remark	Verdict
	- no welding of the contacts		P
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		P
	Dielectric verification:		P
	test voltage (2 Ue / min. 1000 V) for 1 min (V)	1380	—

9.3.4	TEST SEQUENCE III		
	Performance under short-circuit conditions		P
9.3.4.2.1	Test at de prospective current "r":	K3-24A00 230 + U3/32 23-32	P
	type of SCPD	Siemens Fuse gL / gG	—
	ratings of SCPD, co-ordination type 1	100A / 500V / 120kA	—
	ratings of SCPD, co-ordination type 2	-	—
	rated operational current Ie (A) AC-3	32A	—
	prospective current "r" (kA)	3	—
	test voltage (V)	L1: 422 L2: 422 L3: 422	—
	r.m.s. test current (A)	L1: 3000 L2: 3033 L3: 3006	—
	peak current (A)	L1: 4321 L2: 4370 L3: 4330	—
	power factor	0,85	P
	1. one breaking operation of SCPD with all the switching devices closed prior to the test I ² dta (A ² s) /peak current I (A)	L1: 43938 / 3381 L2: 41805 / 3406 L3: 50911 / 3345	—
	2. one breaking operation of SCPD by closing the contactor or starter on to the short-circuit I ² dta (A ² s) /peak current I (A)	L1: 52888 / 3674 L2: 40342 / 3857 L3: 39739 / 3577	—
	Behaviour of the equipment during the test		P

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Clause	Requirement – Test	Result - Remark	Verdict
	Both types of co-ordination (all devices):		P
	A - the fault current has been successfully interrupted by the SCPD or the combination starter and the fuse or fusible element, or solid connection between the enclosure and supply shall not have melted		P
	B - the door or cover of the enclosure has not been blown open and it is possible to open the door or cover		P
	C - there is no damage to the conductors or terminals and the conductors have not been separated from the terminals		P
	D - there is no cracking or breaking of an insulating base to the extent that the integrity of mounting of a live part is impaired		P
	Both types of co-ordination (combination starters and protected starters only):		N
	E - the circuit breaker or the switch is capable of being opened manually by its operating means		N
	F - neither end of the SCPD is completely separated from its mounting means to an exposed conductive part		N
	G - if a circuit breaker with rated ultimate short-circuit breaking capacity less than the rated conditional short-circuit current assigned to the combination or protected starter is employed, the circuit breaker shall be tested to trip:		N
	1) circuit breaker with instantaneous trip relays or releases, at 120% of the trip current		N
	2) circuit breaker with overload relays or releases, at 250% of the rated current of the circuit breaker		N
	Type 1 co-ordination (all devices):		P

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Clause	Requirement – Test	Result - Remark	Verdict
	H - there has been no discharge of parts beyond the enclosure. The starter may be inoperative after each operation		P
	Type 1 co-ordination (combination and protected starters only):		P
	I - dielectric verification test voltage (2 Ue) for 1 min (V)	1380	—
	Type 2 co-ordination (all devices):		N
	J - no damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts is permitted, if they are easily separated without significant deformation		N
	K - the tripping of the overload relay shall be conform to the published tripping characteristics, before and after the test		N
	L - dielectric verification test voltage (2 Ue) for 1 min (V)		—
9.3.4.2.2	Test at the rated conditional short-circuit current "Iq" < "r"		N

9.3.5	TEST SEQUENCE IV: (APPLICABLE FOR CONTACTORS ONLY)		
	Overload current withstand capability of contactors: K3-24A00 230		P
	ambient temperature (°C)	23	—
	rated operational current Ie (A) max. AC-3	40	—
	test current (Ie) (A)	296	—
	duration of test: 10 s	10s	—
	After the test, the contactor shall be substantially in the same condition as before the test (visual inspection)		P

Remarks
