



Test Report issued under the responsibility of:



TEST REPORT
IEC 60947-2
Low-voltage switchgear and controlgear - Part 2: Circuit-breakers

Report Number : 03601-A-18CB0064-S-A
Date of issue : 2018-12-28
Total number of pages : 224



Name of Testing Laboratory preparing the Report : Suzhou Electrical Apparatus Science Research Institute Co., Ltd (EETI)

Applicant's name : Zhejiang Tengen Electric Co., Ltd.
Address : Sulv Industrial Area, Liushi Town, Yueqing City, Zhejiang Province, P.R.China

Test specification:

Standard : IEC 60947-2:2016
Test procedure : CB Scheme
Non-standard test method : N/A

Test Report Form No. : IEC60947_2H
Test Report Form(s) Originator : DEKRA Certification B.V.
Master TRF : Dated 2017-04

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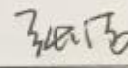
If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laborato and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
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Test item description : Motor Circuit Breaker
Trade Mark : TENGEN
Manufacturer : Zhejiang Tengen Electric Co., Ltd.
Sulv Industrial Area, Liushi Town, Yueqing City, Zhejiang Province, P.R.China
Model/Type reference : TGD1-32

Ratings		See page 10~11
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	Suzhou Electrical Apparatus Science Research Institute Co., Ltd.(EETI)
Testing location/ address		No.7 Yonghe Street, Binhe Road, New District, Suzhou, Jiangsu Province, China
Tested by (name, function, signature)		Lu Jianping (Team leader) 
Approved by (name, function, signature) ...:		Zhang Jie (Supervisor) 
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	
Testing location/ address		
Tested by (name, function, signature):		
Approved by (name, function, signature) ...:		
<input type="checkbox"/>	Testing procedure: CTF Stage 2:	
Testing location/ address		
Tested by (name + signature)		
Witnessed by (name, function, signature) ...:		
Approved by (name, function, signature) ...:		
<input type="checkbox"/>	Testing procedure: CTF Stage 3:	
<input type="checkbox"/>	Testing procedure: CTF Stage 4:	
Testing location/ address		
Tested by (name, function, signature):		
Witnessed by (name, function, signature) ...:		
Approved by (name, function, signature) ...:		
Supervised by (name, function, signature) :		



List of Attachments (including a total number of pages in each attachment):

Attachment 1: photos of the product (page 5, 224)

Summary of testing:

In case of alternative test programs for circuit breakers with a different number of poles, the following program is used:

- Programme 1 (three pole fully tested)
 Programme 2 (four pole fully tested)
 Alternative program not applicable

Tests performed (name of test and test clause):

IEC60947-2

TEST SEQUENCE I:

TGD1-32, 24~32A, sample No.#01
 TGD1-32, 20~25A, sample No.#02
 TGD1-32, 17~23A, sample No.#03
 TGD1-32, 13~18A, sample No.#04
 TGD1-32, 9~14A, sample No.#05
 TGD1-32, 6~10A, sample No.#06
 TGD1-32, 4~6.3A, sample No.#07
 TGD1-32, 2.5~4A, sample No.#08
 TGD1-32, 1.6~2.5A, sample No.#09
 TGD1-32, 1~1.6A, sample No.#10
 TGD1-32, 0.63~1A, sample No.#11
 TGD1-32, 0.4~0.63A, sample No.#12
 TGD1-32, 0.25~0.4A, sample No.#13
 TGD1-32, 0.16~0.25A, sample No.#14
 TGD1-32, 0.1~0.16A, sample No.#15

TEST SEQUENCE II/III

TGD1-32, 24~32A, sample No.#18
 TGD1-32, 13~18A, sample No.#19
 TGD1-32, 0.63~1A, sample No.#20
 TGD1-32, 0.25~0.4A, sample No.#21
 TGD1-32, 0.1~0.16A, sample No.#22
 TGD1-32, 6~10A, sample No.#23#24#25
 TGD1-32, 4~6.3A, sample No.#26
 TGD1-32, 2.5~4A, sample No.#27
 TGD1-32, 1~1.6A, sample No.#28

TEST SEQUENCE II

TGD1-32, 24~32A, sample No.#29-#32
 TGD1-32, 20~25A, sample No.#33
 TGD1-32, 13~18A, sample No.#34-#36

TEST SEQUENCE III

TGD1-32, 24~32A, sample No.#37-#40
 TGD1-32, 20~25A, sample No.#41
 TGD1-32, 13~18A, sample No.#42-#44

TEST SEQUENCE H

TGD1-32, 2.5~4A, sample No.#47
 TGD1-32, 24~32A, sample No.#48

IEC60947-1:

TGD1-32, 0.1~0.16A, sample No.#49
 Clearances and creepage distances 7.1.4
 Comparative tracking index 7.1.4
 Resistance to abnormal heat and fire 8.2.1.1.1

Remark: The corresponding CCC test report No. is 03601-A-15B1861-S. All the test results are copied from the test report.

For IEC 60947-4, please refer to report 03601-A-18CB0064-S-B

Testing location:

Suzhou Electrical Apparatus Science Research Institute Co., Ltd.(EETI)

No.7 Yonghe Street, Binhe Road, New District, Suzhou, Jiangsu Province, China

Summary of compliance with National Differences (List of countries addressed):

N/A


Copy of marking plate:

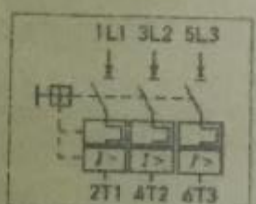
The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

TENGEN

TGD1-32 Motor Circuit Breaker

Ie: 24-32A	GB 14048.2
Ue: 690V 50/60Hz	GB 14048.4
Uimp: 6kV Class: 10A	IEC/EN 60947-2
cat A, AC-3	IEC/EN 60947-4-1





Ue (V)	Icu (kA)	Ics %Icu	Isc > Icu	
			aM	gI/gG
490/415	10	50	80	100
690	3	75	40	50

ZHEJIANG TENGEN ELECTRICS CO.LTD

Test item particulars: test item vs. test requirements

3. Classification

3.1. Selectivity category: (A or B)	A
3.2. Interruption medium: (air, vacuum, gas break):	Air
3.3. Design: (open construction, moulded case).....	Moulded case
3.4. Method of controlling the operation mechanism: (dependent manual, independent manual, dependent power, independent power, stored energy operation).....	Independent manual
3.5. Suitability for isolation: (suitable, not suitable).....	Suitable
3.6. Provision for maintenance: (maintainable, non- maintainable).....	Non-maintainable
3.7. Method of installation: (fixed, plug-in, withdrawable).....	Fixed
3.8. Degree of protection of enclosure: (IP code)	N/A
4.7. Type of release (thermo-magnetic / electronic)	Thermo-magnetic
4.8. Integral fuses (integrally fused circuit-breakers) Type and characteristics of SCPD.....	N/A
7.3 Electromagnetic compatibility (EMC) Environment A or B.....	N/A
Circuit-breaker for use on phase-earthed systems	N/A
Circuit-breaker for use in IT systems.....	N/A
Rated and limiting values, main circuit	
- rated operational voltage: U_e (V)	AC230V/240V, AC400V/415V, AC440V, AC500V, AC690V
- rated insulation voltage: U_i (V).....	690V
- rated impulse withstand voltage: U_{imp} (kV).....	6kV
- rated current: I_n (A)	0.1A~0.16A, 0.16A~0.25A, 0.25A~0.4A, 0.4A~0.63A, 0.63A~1A, 1A~1.6A, 1.6A~2.5A, 2.5A~4A, 4A~6.3A, 6A~10A, 9A~14A, 13A~18A, 17A~23A, 20A~25A, 24A~32A
- kind of current.....	AC
- conventional free air thermal current: I_{th} (A).....	N/A
- conventional enclosed thermal current: I_{the} (A)	N/A
- current rating for four-pole circuit-breakers: (A).....	N/A
- number of poles	3P
- rated frequency: (Hz)	50/60Hz
- integral fuses (rated values)	N/A

Rated duty :	
- eight-hour duty	0.1A~0.16A, 0.16A~0.25A, 0.25A~0.4A, 0.4A~0.63A, 0.63A~1A, 1A~1.6A, 1.6A~2.5A, 2.5A~4A, 4A~6.3A, 6A~10A, 9A~14A, 13A~18A, 17A~23A, 20A~25A, 24A~32A
- uninterrupted duty: I_u (A)	N/A
Short-circuit characteristic :	
rated short-time making capacity: I_{cm} (kA)	/
rated ultimate short-circuit breaking capacity: I_{cu} (kA)	AC230V/240V: 100kA(In: 0.1~0.16A to 13~18A); 50kA(In: 17~23A to 24~32A); AC400V/415V: 100kA(In: 0.1~0.16A to 6~10A); 15kA(In: 9~14A to 20~25A); 10kA(In: 24~32A); AC440V: 100kA(In: 0.1~0.16A to 2.5~4A); 50kA(In: 4~6.3A); 15kA(In: 6~10A); 8kA(In: 9~14A to 13~18A); 6kA(In: 17~23A to 24~32A); AC500V: 100kA(In: 0.1~0.16A to 2.5~4A); 50kA(In: 4~6.3A); 10kA(In: 6~10A); 6kA(In: 9~14A to 13~18A); 4kA(In: 17~23A to 24~32A); AC690V: 100kA(In: 0.1~0.16A to 1~1.6A); 3kA(In: 1.6~2.5A to 24~32A);
rated service short-circuit breaking capacity: I_{cs} (kA)	AC230V/240V: 100kA(In: 0.1~0.16A to 13~18A); 50kA(In: 17~23A to 24~32A); AC400V/415V: 100kA(In: 0.1~0.16A to 6~10A); 7.5kA(In: 9~14A to 13~18A); 6kA(In: 17~23A to 24~32A); AC440V: 100kA(In: 0.1~0.16A to 2.5~4A); 50kA(In: 4~6.3A); 15kA(In: 6~10A); 4kA(In: 9~14A to 13~18A); 3kA(In: 17~23A to 24~32A); AC500V: 100kA(In: 0.1~0.16A to 2.5~4A); 50kA(In: 4~6.3A); 10kA(In: 6~10A); 4.5kA(In: 9~14A to 13~18A); 3kA(In: 17~23A to 24~32A); AC690V: 100kA(In: 0.1~0.16A to 1~1.6A); 2.25kA(In: 1.6~2.5A to 24~32A);
rated short-time withstand current: I_{cw} (kA/s)	N/A
Selectivity category (A or B)	A
Control circuits :	
Electrical control circuits :	
- kind of current: (AC, DC)	N/A
- rated frequency: (Hz)	N/A
- rated control circuit voltage: U_c (nature, frequency, V)	N/A
- rated control supply voltage: U_s (nature, frequency V)	N/A
Air supply control circuits: (pneumatic or electro-pneumatic) :	
- rated pressure and its limit	N/A
- volumes of air, at atmospheric pressure, required for each closing and each opening operation	N/A

Auxiliary circuits :	
Rated and limiting values, auxiliary circuits	
- rated operational voltage U_e (V)	N/A
- rated insulation voltage: U_i (V).....	N/A
- rated operational current: I_e (A)	N/A
- kind of current	N/A
- rated frequency: (Hz)	N/A
- number of circuits	N/A
- number and kind of contact elements	N/A
- rated uninterrupted current: I_u (A).....	N/A
- utilization category: (AC, DC, current and voltage)	N/A
Short-circuit characteristic :	
- Rated conditional short-circuit current (kA)	1kA
- kind of protective device	FUSE

Releases :

- 1) shunt release: Yes
 2) Over-current release.....: Yes
 a) instantaneous.....: Yes
 b) definite time delay.....: Yes
 c) inverse time delay.....: Yes
 - independent of previous load: N/A
 - dependent on previous load; (for example thermal type release): Yes
 3) Undervoltage release (for opening).....: Yes
 4) Other releases: N/A

Characteristics :

- 1) Shunt release and undervoltage release (for opening).....:
 - rated control circuit voltage: U_c (nature, frequency, V): shunt release : AC110V~127V,220V~240V,
 380V~415V
 undervoltage release : AC110V~127V,
 220V~240V,380V~415V
 - kind of current.....: AC
 - rated frequency: (if AC).....: 50/60Hz
 2) Over-current release.....:
 - rated current.....: $13I_n \pm 20\%$
 - kind of current.....: AC
 - rated frequency: (if AC).....: 50/60Hz
 - current setting (or range of settings): $13I_n \pm 20\%$
 - time settings (or range of settings).....: $< 0.2s$

Classification of installation and use.....	Fixed or guide
Supply Connection	Terminal cable
.....	
.....	
Possible test case verdicts:	
- test case does not apply to the test object.....	N/A
- test object does meet the requirement.....	P (Pass)
- test object does not meet the requirement.....	F (Fail)
Testing.....	
Date of receipt of test item.....	2015-12-07, 2018-11-27
Date (s) of performance of tests.....	2015-12-09~2015-12-30, 2018-11-30~2018-12-01
General remarks:	
"(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 <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60947-2:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies)	Zhejiang Tengen Electric Co., Ltd. No.332 Liule Road, LiushiTown, Yueqing City, Zhejiang Province, P.R.China
General product information:	
TGD1-32	
Ui: 690V; Uimp: 6kV;	
Ue: AC230V/240V,AC400V/415V,AC440V,AC500V,AC690V;	
In: 0.1A~0.16A,0.16A~0.25A,0.25A~0.4A,0.4A~0.63A,0.63A~1A, 1A~1.6A,1.6A~2.5A,2.5A~4A,4A~6.3A,6A~10A,9A~14A,13A~18A, 17A~23A,20A~25A,24A~32A;	
Over-current Release Type: Thermo-magnetic;	
Rated short circuit beaking capacity: see annex;	
50/60Hz;	
Utilization Category: A;	
3P;	
Tripping class: 10A.	

Annex:

0.1~0.16A, 0.16~0.25A, 0.25~0.4A, 0.4~0.63A, 0.63~1A, 1~1.6A:
Ics=Icu: 100kA(AC230V/240V, AC400V/415V, AC440V, AC500V, AC690V);
1.6~2.5A, 2.5~4A:
Ics=Icu: 100kA(AC230V/240V, AC400V/415V, AC440V, AC500V),
Icu: 3kA(AC690V) Ics: 2.25kA(AC690V);
4~6.3A:
Ics=Icu: 100kA(AC230V/240V, AC400V/415V), 50kA(AC440V, AC500V),
Icu: 3kA(AC690V), Ics: 2.25kA(AC690V);
6~10A:
Ics=Icu: 100kA(AC230V/240V, AC400V/415V), 15kA(AC440V), 10kA(AC500V),
Icu: 3kA(AC690V), Ics: 2.25kA(AC690V);
9~14A, 13~18A:
Ics=Icu: 100kA(AC230V/240V), Icu: 15kA(AC400V/415V) Ics: 7.5kA(AC400V/415V),
Icu: 8kA(AC440V) Ics: 4kA(AC440V), Icu: 6kA(AC500V) Ics: 4.5kA(AC500V),
Icu: 3kA(AC690V) Ics: 2.25kA(AC690V);
17~23A, 20~25A:
Ics=Icu: 50kA(AC230V/240V), Icu: 15kA(AC400V/415V) Ics: 6kA(AC400V/415V),
Icu: 6kA(AC440V) Ics: 3kA(AC440V), Icu: 4kA(AC500V) Ics: 3kA(AC500V),
Icu: 3kA(AC690V) Ics: 2.25kA(AC690V);
24~32A:
Ics=Icu: 50kA(AC230V/240V), Icu: 10kA(AC400V/415V) Ics: 5kA(AC400V/415V),
Icu: 6kA(AC440V) Ics: 3kA(AC440V), Icu: 4kA(AC500V) Ics: 3kA(AC500V),
Icu: 3kA(AC690V) Ics: 2.25kA(AC690V).

Type Explanation:

TG D 1 — 32

