

NOTIFICATION OF TEST RESULTS

Product

Terminal blocks for copper conductors

Tested by request of

WAGO Kontakttechnik GmbH
Hansastraße 27, 32423 Minden, Germany

Manufactured at (name and place)

WAGO Kontakttechnik GmbH
Hansastraße 27, 32423 Minden, Germany

Rating and principal characteristics

See TRF 2031569.54 and 2031569.55

Pre-licence factory inspection carried out by

KEMA

Trademark (if any)

WAGO

Model/Type Ref

TOPJOB S 2016

Additional information (if any)

A sample of the product has been tested and found to be in conformity with the current HD/EN and equivalent national standard, (number and edition)

EN 60947-7-1:2002 and EN 60947-7-2:2002

As shown in the Test Report (ref. No.)

2031569.54 (18 pages) and 2031569.55 (21 pages)

This Notification of Test Results is the result of testing a sample of the product submitted, in accordance with the provisions of the relevant specific standard.

This Notification of Test Results has been established by a body, which participates in the CENELEC Certification Agreement (CCA) of 11th September 1973 as amended on 29th March 1983. Any other body participating in the CCA will take this Notification as a basis for granting a national mark of conformity or a national approval as specified in the CCA, as long as the standard referred to above is still in force in the country of that body.

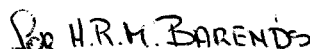
KEMA Quality B.V.

Arnhem,

Signature:



Date: May 7, 2004


H.H.M. Versteegen

Internal ref: WvG/HLS

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TEST REPORT
IEC 60 947-7-2 and EN 60 947-7-2
Low-voltage switchgear and controlgear
Part 7: Ancillary equipment

Section Two: Protective terminal terminal blocks for copper conductors

Report Reference No. : **2031569.55**

Compiled by (+ signature)..... : **W.C. Ginkel**

Approved by (+ signature)..... : **H.L. Schendstok** b.a. HGM Karmelink

Date of issue : **17-06-2004**

This report is based on a blank test report that was prepared by KEMA using information obtained from the TRF originator (see below).

CB Testing Laboratory : KEMA Quality B.V.

Address : Utrechtseweg 310, 6812 AR, Arnhem, The Netherlands

Testing location/procedure : CBTL ☒ SMT ☐ TMP ☐

Address : as above

• **Applicant's name** : **WAGO Kontakttechnik GmbH**

Address : **Hansastraße 27, Minden, Germany**

Test specification:

Standard : EN 60 947-7-2:2002

Test procedure : CB / CCA

Non-standard test method : N/A

Test Report Form No. : IEC 60947-7-2B

TRF Originator : KEMA

Master TRF :

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Test item

Description : **Ground (earth) conductor terminal blocks**

Trademark : **WAGO**

Model and/or type reference : **TOPJOB S 2016**

Manufacturer : **WAGO Kontakttechnik GmbH**

Rating(s)..... : **16 mm²**

..... :

Particulars: test item vs. test requirements

- method of fixing..... : **mounting on top hat rail 35 mm (EN 50022)**
- number of poles : **1 pole**
- type of clamping unit..... : **screwless terminals**
- ability to receive conductors..... : **unprepared conductors, flexible or rigid**
- number of terminals on terminal assembly : **2, and 3**
- PE or PEN functions : **PE**
- rated cross-section (mm²) : **16 mm²**
- rated connecting capacity (mm²) : **0,5 mm² - 16 mm² rigid and flexible**
25 mm²

Copy of marking plate and summary of test results (information/comments):

WAGO

TOPJOB S 2016

IEC 60947-7-2

16 mm²

Summary of testing:

Complete investigation

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 : **02-2004**

Date (s) of performance of tests : **02-2004**

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 60947-7-2B.

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

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

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

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

All tests carried out at type TOPJOB S 2016 1307 unless otherwise stated

General product information:

See page 20 and 21

IEC 60 947-7-2 and EN 60 947-7-2			
Clause	Requirement – Test	Result - Remark	Verdict

5.1	MARKING		
	Terminal block shall be marked with:		
	- manufacturer's name or trademark	WAGO	P
	- type designation	TOPJOB S 2016	P
5.2	The following information shall be stated by the manufacturer if applicable, e.g. in the manufacturer's data sheet, or his catalogue on the packing unit:		
	- manufacturer's claim for compliance with EN 60 947-7-2	IEC 60947-7-2	P
	- rated cross-section	16 mm²	P
	- rated connecting capacity	0,5 mm² - 16,0 mm² rigid and flexible 25 mm² flexible	P
	- service conditions, if different from those of Cl. 6.		N
	- PE function only if supplied with or intended for use only with steel in the current-carrying path		N

7.	CONSTRUCTION		
7.1	Constructional requirements		
7.1.1	Terminals		
	Terminals shall permit a reliable connection between the conductor clamping unit and the clamping unit to the support		P
7.1.7.1	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength		P
	Clamping units connections shall be such that necessary contact pressure is maintained		P
	Clamping units shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal		P

IEC 60 947-7-2 and EN 60 947-7-2			
Clause	Requirement – Test	Result - Remark	Verdict
	Clamping units shall not allow the conductor to be displaced or to be displaced themselves in a manner detrimental to the operation of equipment and the insulation voltage shall not be reduced below the rated value		P
	Clamping units shall allow the conductor to be connected by means ensuring that a reliable mechanical linkage and electrical contact is properly maintained		P
	Clamping units shall be able to withstand the forces that can be applied through the connected conductors		P
	Contact pressure is not transmitted through insulation materials		P
7.1.2	Connection of support		
	Protective conductor terminal blocks are provided with means that allow them to be securely attached to the corresponding support without risk of galvanic corrosion		P
	The design of the protective conductor terminal blocks shall clearly show how the fixation has to be made to ensure the correct conducting connection to appropriate support		P
	The clamping connection to the support shall only be released by means of tools		P
7.1.3	Clearances and creepage distances		
	Clearances and creepage distances do not apply to protective conductor terminal blocks		P

IEC 60 947-7-2 and EN 60 947-7-2			
Clause	Requirement – Test	Result - Remark	Verdict
7.1.4	Terminal identification and marking:		
	- terminal block shall have provision, or at least space, for identification marks or numbers for each terminal or terminal assembly to be related to the circuit of which it is to form a part		P
	- any partial insulated protective conductor terminal block shall be coloured green and yellow		P
7.1.5	Resistance to abnormal heat and fire		
	Needle flame test for insulation materials of terminal blocks (see 8.5)		P
7.1.6	Rated cross section and rated connecting capacity		
	Terminal blocks are so designed that conductors of the rated cross-section and/or the rated connecting capacity can be accepted	0,5 mm² - 16 mm² rigid and flexible 25 mm² flexible	P
7.1.7	Protective conductor mounting rails		
	Type of mounting rails	Top hat rail 35 mm (EN 50022)	P

8.	TESTS		
8.3	Verification of mechanical characteristics		
8.3.2	Attachment of the terminal block on its support		
	mounting rail	Top hat rail 35 mm (EN 50022)	—
	torque (Nm) clamping to support	-	—
	steel pin diameter (mm)	2,8 mm	—
	tightening torque clamping units (Nm)	-	—
	force (N)	5 N	—
	During the test, no terminal block shall work free from its rail or support, nor suffer any other damage		P
8.3.3.1	Test of mechanical strenght of clamping units		
8.2.4.2	Mechanical strength of terminals (IEC 60947-1)		

IEC 60 947-7-2 and EN 60 947-7-2			
Clause	Requirement – Test	Result - Remark	Verdict
	rated cross-section of a rigid conductor (mm ²):	16 mm²	—
	diameter of thread (mm)	-	—
	torque (Nm)	-	—
	5 times on 2 separate clamping units		P
	Voltage drop before and after mechanical strength test		
	rated cross-section of a rigid conductor (mm ²):	16 mm²	—
	test current (A) d.c.:	7,6 A	—
	voltage drop (mV) before mechanical strength test not exceeding 3,2 mV	1,34 mV – 1,21 mV	P
	If the measured value exceeds 3,2 mV, the voltage drop is determined on each individual clamping unit separately, which shall not exceed 1,6 mV		N
	voltage drop (mV) after mechanical strength test not exceeding 150% of the value measured before mechanical strength test	1,41 mV – 1,15 mV	P
	minimum cross-section of a flexible conductor (mm ²)	0,5 mm²	—
	test current (A) d.c.:	0,6 A	—
	voltage drop (mV) before mechanical strength test not exceeding 3,2 mV	0,47 mV – 0,51 mV	P
	If the measured value exceeds 3,2 mV, the voltage drop is determined on each individual clamping unit separately, which shall not exceed 1,6 mV		N
	voltage drop (mV) after mechanical strength test not exceeding 150% of the value measured before mechanical strength test	0,52 mV – 0,42 mV	P
	Mechanical strength of the clamping to support		
	- rail profile	Top hat rail 35 mm (EN 50022)	—
	diameter of thread (mm)	-	—
	torque (Nm)	-	—
	5 times on 2 separate clamping units		P

IEC 60 947-7-2 and EN 60 947-7-2			
Clause	Requirement – Test	Result - Remark	Verdict
	rated cross-section of a rigid conductor (mm ²):	16 mm²	—
	test current (A) d.c.:	7,6 A	—
	voltage drop (mV) before mechanical strength test not exceeding 6,4 mV:	1,47 mV – 1,21 mV	P
	If the measured value exceeds 6,4 mV, the voltage drop is determined on each individual clamping unit separately, which shall not exceed 4,8 mV		N
	voltage drop (mV) after mechanical strength test not exceeding 150% of the value measured before mechanical strength test:	1,58 mV – 1,11 mV	P
8.3.4.2	Testing for damage to and accidental loosening of conductor (flexion test) (type 2016-1307)		
	conductor of the smallest cross-section (mm ²):	0,5 mm²	—
	number of conductor of the smallest cross-section:	1	—
	diameter of bushing hole (mm):	6,4 mm	—
	height between the equipment and the platen (mm):	260 mm	—
	mass at the conductor(s) (kg):	0,3 kg	—
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Pull-out test		
	force (N):	30 N	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	conductor of the rated cross-section (mm ²) :	16 mm²	—
	number of conductor of the rated cross-section ...:	1	—
	diameter of bushing hole (mm):	13 mm	—
	height between the equipment and the platen (mm):	300 mm	—
	mass at the conductor(s) (kg):	2,9 kg	—

IEC 60 947-7-2 and EN 60 947-7-2			
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		
	force (N)	100 N	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	conductor of the largest cross-section (mm ²)	25 mm² flexible	—
	number of conductor of the largest cross-section :	1	—
	diameter of bushing hole (mm)	13 mm	—
	height between the equipment and the platen (mm)	300 mm	—
	mass at the conductor(s) (kg)	4,5 kg	—
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Pull-out test		
	force (N)	135 N	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	conductor of the largest or smallest cross-section (mm ²)		—
	number of conductor of the largest or smallest cross-section		—
	diameter of bushing hole (mm)		—
	height between the equipment and the platen (mm)		—
	mass at the conductor(s) (kg)		—
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		N
	Pull-out test		

IEC 60 947-7-2 and EN 60 947-7-2			
Clause	Requirement – Test	Result - Remark	Verdict
	force (N)		—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		N
8.3.4.4	Verification of rated cross section and rated connecting capacity		
	One conductor of the two next smaller cross-sections can be unhindered and connected in each clamping unit of one terminal block (up to 35 mm ²)	6 mm²	P
8.4.3	Dielectric test		
	Dielectric test, Uimp indicated:		
	- The test is made on protective terminal blocks installed with terminal blocks of the same series and size according to the manufactures instructions rated cross-section (mm ²)/type/ conductor end length (mm)	Type 2016-1301 16 mm², rigid, 18-20 mm	—
	- rated impulse withstand voltage (kV)	8 kV	—
	- test Uimp main circuits (kV)	9,8 kV	P
	Dielectric test, Uimp not indicated:		
	- The test is made on protective terminal blocks installed with terminal blocks of the same series and size according to the manufactures instructions rated cross-section (mm ²)/type/ conductor end length (mm)	Type 2016-1301 16 mm², rigid, 18-20 mm	—
	- rated insulation voltage (V)	800 V	—
	- test voltage for 5 sec (V)	2000 V	P
8.4.5	Temperature rise test		
	Temperature rise conditions:		
	- test current (A)	76 A	—
	- cross-section of the conductor (mm ²)	16 mm²	—
	- torque (Nm) clamping unit	-	—
	- torque (Nm) clamping to support	-	—
	Temperature rise without support		

IEC 60 947-7-2 and EN 60 947-7-2			
Clause	Requirement – Test	Result - Remark	Verdict
	- temperature rise does not exceed 45 K	31 K – 38 K	P
	Voltage drop before and after temperature rise test:		
	- test current (A) d.c.	7,6 A	—
	- voltage drop (mV) before temperature rise test not exceeding 3,2 mV	1,29 mV – 1,68 mV	P
	If the measured value exceeds 3,2 mV, the voltage drop is determined on each individual clamping unit separately, which shall not exceed 1,6 mV		N
	- voltage drop (mV) after temperature rise test not exceeding 150% of the value measured before temperature rise test	1,09 mV – 1,76 mV	P
	Temperature rise with support		
	- rail profile and material	Top hat rail 35 mm (EN 50022) Cu	—
	- temperature rise does not exceed 45 K	19 K – 21 K	—
	Voltage drop before and after temperature rise test:		
	- test current (A) d.c.		—
	- voltage drop (mV) before temperature rise test not exceeding 6,4 mV	1,07 mV – 1,25 mV	P
	If the measured value exceeds 6,4 mV, the voltage drop is determined on each individual clamping unit separately, which shall not exceed 4,8 mV		N
	- voltage drop (mV) after temperature rise test not exceeding 150% of the value measured before temperature rise test	1,01 mV – 1,47 mV	P
8.4.6	Short-time withstand current test		
	- cross-section of the conductor (mm ²)	16 mm²	—
	- torque (Nm) clamping unit	-	—

IEC 60 947-7-2 and EN 60 947-7-2			
Clause	Requirement – Test	Result - Remark	Verdict
	- rail profile and material	Top hat rail 35 mm (EN 50022) Cu	—
	- torque (Nm) clamping to support	-	—
	Test current from clamping unit to clamping unit (1-1)		
	- test current (A)	1 – 1920 A 2 – 1920 A 3 – 1920 A	—
	- duration of the test current (s)	1 – 1 s 2 – 1 s 3 – 1 s	—
	At the end of the test no damage that may impair further use shall have occurred to any part of the terminal block		P
	Voltage drop after short-time withstand current test		
	- cross-section of the conductor (mm ²)	16 mm²	—
	- test current (A) d.c.	7,6 A	—
	- voltage drop (mV) after short-time withstand current test not exceeding 3,2 mV	1,51 mV	P
	If the measured value exceeds 3,2 mV, the voltage drop is determined on each individual clamping unit separately, which shall not exceed 1,6 mV		N
	Test current from clamping unit to support (2-2)		
	- test current (A)	1 – 1920 A 2 – 1920 A 3 – 1920 A	—
	- duration of the test current (s)	1 – 1 s 2 – 1 s 3 – 1 s	—
	At the end of the test no damage that may impair further use shall have occurred to any part of the terminal block		P
	Voltage drop after short-time withstand current test		

IEC 60 947-7-2 and EN 60 947-7-2			
Clause	Requirement – Test	Result - Remark	Verdict
	- cross-section of the conductor (mm ²)	16 mm²	—
	- test current (A) d.c.	7,6 A	—
	- voltage drop (mV) after short-time withstand current test not exceeding 6,4 mV	1,35 mV	P
	If the measured value exceeds 6,4 mV, the voltage drop is determined on each individual clamping unit separately, which shall not exceed 4,8 mV		N
8.4.7	Ageing test for screwless type terminal block		
	Maximum ambient temperature (°C)	40 °C	—
	Rated cross-section solid or stranded (mm ²)	16 mm²	—
	Heating cabinet is increased, in each cycle to (°C)	85 °C	—
	Test current (A) d.c. for measurement of the voltage drop	7,6 A	—
	Rail profile and material	Cu	—
	Torque (Nm) clamping to support	-	—
	Voltage drop after 0 cycles:		
	- requirement for clamping unit to clamping unit: ≤ 3,2 mV (mV)	1 – 1,20 mV 2 – 1,40 mV 3 – 1,30 mV 4 – 1,60 mV 5 – 1,50 mV	P
	If the measured value exceeds 3,2 mV, the voltage drop is determined on each individual clamping unit separately, which shall not exceed 1,6 mV		N
	- requirement for clamping unit to support: ≤ 6,4 mV (mV)	1 – 1,90 mV 2 – 2,10 mV	P
	If the measured value exceeds 6,4 mV, the voltage drop is determined on each individual clamping unit separately, which shall not exceed 4,8 mV		N

IEC 60 947-7-2 and EN 60 947-7-2			
Clause	Requirement – Test	Result - Remark	Verdict
	Voltage drop after the 24th cycle:		
	- requirement for clamping unit to clamping unit: 4,8 mV (mV)	1 – 1,20 mV 2 – 1,40 mV 3 – 1,30 mV 4 – 1,50 mV 5 – 1,40 mV	P
	- requirement for clamping unit to support: 9,6 mV (mV)	1 – 1,90 mV 2 – 2,10 mV	P
	Voltage drop after the 48th cycle		
	- requirement for clamping unit to clamping unit: ≤ 4,8 mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 1,30 mV 2 – 1,40 mV 3 – 1,30 mV 4 – 1,50 mV 5 – 1,40 mV	P
	- requirement for clamping unit to support: ≤ 9,6 mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 1,90 mV 2 – 2,10 mV	P
	Voltage drop after the 72th cycle:		
	- requirement for clamping unit to clamping unit: ≤ 4,8 mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 1,30 mV 2 – 1,30 mV 3 – 1,20 mV 4 – 1,50 mV 5 – 1,80 mV	P
	- requirement for clamping unit to support: ≤ 9,6 mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 2,00 mV 2 – 2,10 mV	P
	Voltage drop after the 96th cycle:		
	- requirement for clamping unit to clamping unit: ≤ 4,8 mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 1,20 mV 2 – 1,40 mV 3 – 1,20 mV 4 – 1,60 mV 5 – 1,50 mV	P

IEC 60 947-7-2 and EN 60 947-7-2			
Clause	Requirement – Test	Result - Remark	Verdict
	- requirement for clamping unit to support: $\leq$ 9,6 mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 2,00 mV 2 – 2,10 mV	P
	Voltage drop after the 120th cycle:		
	- requirement for clamping unit to clamping unit: $\leq$ 4,8 mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 1,20 mV 2 – 1,40 mV 3 – 1,30 mV 4 – 1,60 mV 5 – 2,00 mV	P
	- requirement for clamping unit to support: $\leq$ 9,6 mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 2,00 mV 2 – 2,20 mV	P
	Voltage drop after the 144th cycle:		
	- requirement for clamping unit to clamping unit: $\leq$ 4,8 mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 1,20 mV 2 – 1,30 mV 3 – 1,30 mV 4 – 1,60 mV 5 – 1,50 mV	P
	- requirement for clamping unit to support: $\leq$ 9,6 mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 2,00 mV 2 – 2,20 mV	P
	Voltage drop after the 168th cycle:		
	- requirement for clamping unit to clamping unit: $\leq$ 4,8 mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 1,30 mV 2 – 1,40 mV 3 – 1,20 mV 4 – 1,60 mV 5 – 1,50 mV	P
	- requirement for clamping unit to support: $\leq$ 9,6 mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 2,00 mV 2 – 2,20 mV	P
	Voltage drop after the 192th cycle:		

IEC 60 947-7-2 and EN 60 947-7-2			
Clause	Requirement – Test	Result - Remark	Verdict
	- requirement for clamping unit to clamping unit: $\leq$ 4,8 mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 1,30 mV 2 – 1,40 mV 3 – 1,20 mV 4 – 1,60 mV 5 – 1,50 mV	P
	- requirement for clamping unit to support: $\leq$ 9,6 mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 2,00 mV 2 – 2,20 mV	P
	Pull-out test		
	force (N)	100 N	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
8.5	Verification of thermal characteristics		P
	Before the test, the terminal blocks are stored for 24 h in an atmosphere having a temperature between 15°C and 35°C and a relative humidity between 45% and 75%		P
	The flame is applied for 10s. for insulation walls <1 mm and/or an area <100 mm ² , the flame is applied for 5 s.		P
	The terminal blocks are considered to have passed the test if the duration of burning is < 30s in case of ignition. Moreover, the tissue paper on the pinewood board shall not ignite if burning or glowing particles fall from the terminal block.		P
8.6	Verification of EMC characteristics		N
	Subclause 8.4 of IEC 60947-1 applies with the following addition		N
8.6.1	immunity		N

IEC 60 947-7-2 and EN 60 947-7-2			
Clause	Requirement – Test	Result - Remark	Verdict
	Terminal blocks within the scope of this standard are not sensitive of electromagnetic disturbances and therefore no immunity tests are necessary.		N
8.6.2	Emission		N
	Terminal blocks within the scope of this standard do not generate electromagnetic disturbances and therefore no emission tests are necessary.		N

Remarks

Additional test:

- The materials were subjected to a ball pressure test according EN 60947-1 at a temperature of 125 °C for insulation materials necessary to retain current carrying parts.

The diameter of the impression caused by the ball was less than the required 2 mm.

- Parts of insulation material necessary to retain current carrying parts were subjected to a glow-wire test according EN 60947-1, at 960 °C.

This test withstood well.

- The terminal blocks were stored in a humidity cabinet containing air with relative humidity between 91% and 95 %, temperature of air between 20 °C and 30 °C.

After 48 hours the insulation resistance was measured with a d.c. voltage of 500 V for 1 minute.

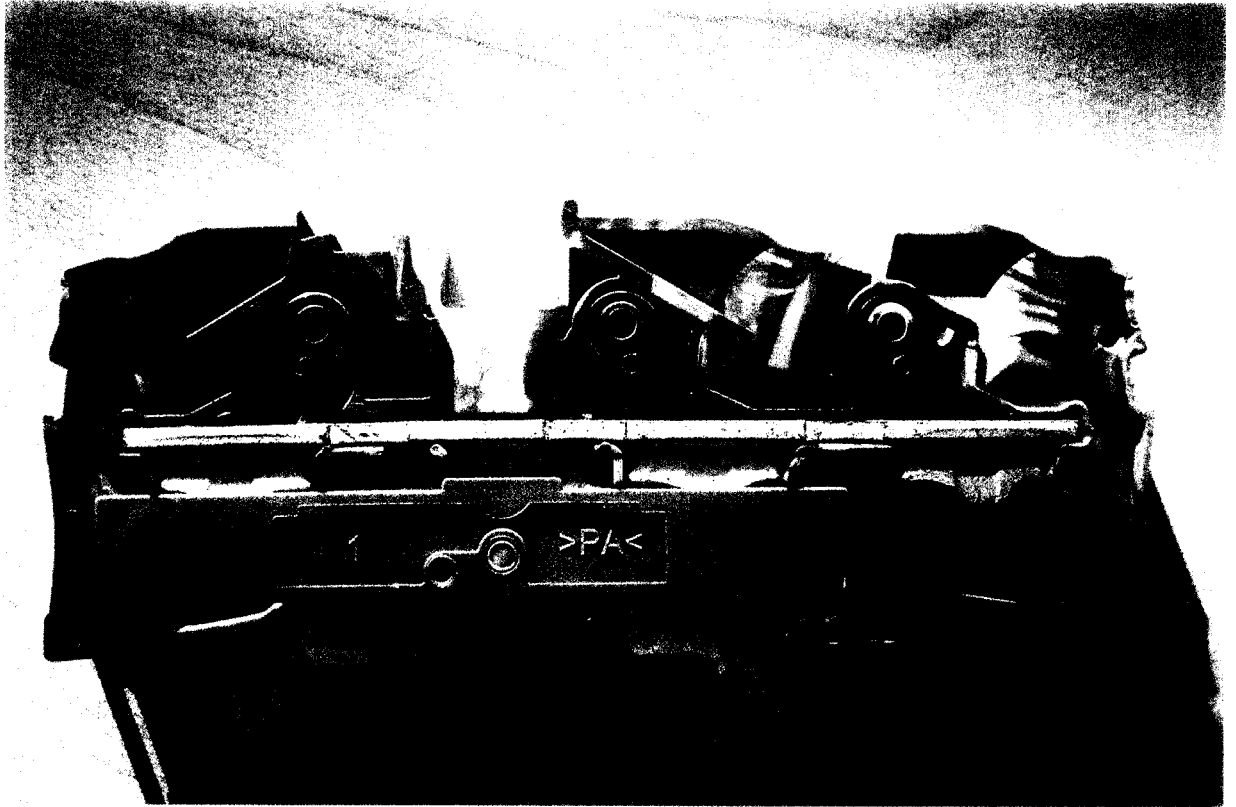
The resistance was more than the required 2 MΩ, measured > 20 MΩ.

Remarks

Description of types

type	:	2016 with suffixes -1201, -1202, -1203, -1204, -1205, -1206, -1208, -1209
description	:	two-conductor through terminal block, with screwless-type terminals, 1-pole
type	:	2016-1207
description	:	two conductor earth terminal block, with screwless-type terminals, 1-pole
type	:	2016 with suffixes -1301, -1302, -1303, 1304, -1305, -1306, -1308, -1309
description	:	three conductor through terminal block, with screwless-type terminals, 1-pole
type	:	2016-1307
description	:	three conductor earth terminal block, with screwless-type terminals, 1-pole

Remarks



TEST REPORT
IEC 60 947-7-1 and EN 60 947-7-1
Low-voltage switchgear and controlgear
Part 7: Ancillary equipment

Section One: Terminal blocks for copper conductors

Report Reference No. : **2031569.54**

Compiled by (+ signature) : **W.C. Ginkel**

Approved by (+ signature) : **H.L. Schendstok** *ba H.G.N. Karmelink*

Date of issue : **17-06-2004**

This report is based on a blank test report that was prepared by KEMA using information obtained from the TRF originator (see below).

CB Testing Laboratory : KEMA Quality B.V.

Address : Utrechtseweg 310, 6812 AR Arnhem, The Netherlands

Testing location/procedure : CBTL ☒ SMT ☐ TMP ☐

Address : as above

Applicant's name : **WAGO Kontakttechnik GmbH**

Address : **Hansastraße 27, Minden, Germany**

Test specification:

Standard : EN 60 947-7-1:2002

Test procedure : CB / CCA

Non-standard test method : N/A

Test Report Form No. : IEC 60947-7-1B

TRF Originator : KEMA

Master TRF :

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Test item

Description : **Rail mounted terminal blocks**

Trademark : **WAGO**

Model and/or type reference : **TOPJOB S 2016**

Manufacturer : **WAGO Kontakttechnik GmbH**

Rating(s).....: **800 V, 16 mm²**

Particulars: test item vs. test requirements

- method of fixing: **mounting on top hat rail 35 mm (EN 50022)**
- number of poles: **1 pole**
- type of clamping units: **screwless terminals**
- ability to receive conductors: **unprepared conductors, flexible or rigid**
- number of terminals on terminal assembly: **2 and 3**
- rated voltage (V): **800 V**
- rated cross-section (mm²): **16 mm²**
- rated connecting capacity (mm²): **0,5 mm² - 16 mm² rigid and flexible**
25 mm² flexible
- rated impulse withstand voltage Uimp (kV).....: **8 kV**

Copy of marking plate and summary of test results (information/comments):

WAGO

TOPJOB S 2016

IEC 60947-7-1

800 V, 16 mm²

Summary of testing:

Complete investigation

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 : **02-2004**

Date (s) of performance of tests : **02-2004**

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 IECEE 02.

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

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

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

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

All tests are carried out at type TOPJOB S 2016 1301 unless otherwise stated

General product information:

See page 17 and 18

IEC 60 947-7-1 and EN 60 947-7-1			
Clause	Requirement – Test	Result - Remark	Verdict

5.1	MARKING		
	Terminal block shall be marked with:		
	- manufacturer's name or trademark	WAGO	P
	- type designation	TOPJOB S 2016	P
5.2	The following information shall be stated by the manufacturer if applicable, e.g. in the manufacturer's data sheet, or his catalogue on the packing unit:		
	- manufacturer's claim for compliance with EN 60 947-7-1	IEC 60947-7-1	P
	- rated cross-section	16 mm²	P
	- rated connecting capacity	0,5 mm² - 16 mm² rigid and flexible 25 mm² flexible	P
	- rated insulation voltage	800 V	P
	- rated impulse withstand voltage	-	N
	- service conditions, if different from those of Cl. 6.		N

7.	CONSTRUCTION		
7.1	Constructional requirements		
7.1.1	Clamping units		
7.1.7.1	All parts of clamping units which maintain contact and carry current shall be of metal having adequate mechanical strength		P
	Clamping units connections shall be such that necessary contact pressure is maintained		P
	Clamping units shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal		P

IEC 60 947-7-1 and EN 60 947-7-1			
Clause	Requirement – Test	Result - Remark	Verdict
	Clamping units shall not allow the conductor to be displaced or to be displaced themselves in a manner detrimental to the operation of equipment and the insulation voltage shall not be reduced below the rated value		P
	Clamping units shall allow the conductor to be connected by means ensuring that a reliable mechanical linkage and electrical contact is properly maintained		P
	Clamping units shall be able to withstand the forces that can be applied through the connected conductors		P
	Contact pressure is not transmitted through insulation materials		P
7.1.2	Mounting		
	Terminal blocks shall be provided with means that allow them to be securely attached to a rail or a mounting surface (see 8.3.2)		P
7.1.3	Clearances and creepage distances		
	For clearances and creepage distances see 8.4.2		P
7.1.4	Terminal identification and marking:		
	- terminal intended exclusively for the neutral conductor		N
	- other terminals		P
	- terminal block shall have provision, or at least space, for identification marks or numbers for each terminal or terminal assembly to be related to the circuit of which it is to form a part		P
7.1.5	Resistance to abnormal heat and fire		
	Needle flame test for insulation materials of terminal blocks (see 8.5)		P
7.1.6	Rated cross-section and rated connecting capacity		

IEC 60 947-7-1 and EN 60 947-7-1			
Clause	Requirement – Test	Result - Remark	Verdict

	Terminal blocks are so designed that conductors of the rated cross-section and/or the rated connecting capacity can be accepted		P
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8	TESTS		
8.3	Verification of mechanical characteristics		
8.3.2	Attachment of the terminal block on its support		
	mounting rail	Top hat rail 35 mm (EN 50022)	—
	Tighting torque (Nm)	-	—
	steel pin diameter (mm)	2,8 mm	—
	force (N)	5 N	—
	During the test, no terminal block shall work free from its rail or support, nor suffer any other damage		P
8.3.4	Mechanical properties of clamping units		
8.3.4.1	Test of mechanical strenght of clamping units		
8.2.4.1	Mechanical strength of clamping units (IEC60947-1)		
	rated cross-section of a rigid conductor (mm ²)	16 mm²	—
	diameter of thread (mm)	-	—
	torque (Nm)	-	—
	5 times on 2 clamping units at the centre terminal block out of 5 terminal blocks		P
	Voltage drop before and after mechanical strength test		
	rated cross-section of a rigid conductor (mm ²)	16 mm²	—
	test current (A) d.c.	7,6 A	—
	voltage drop (mV) before mechanical strength test not exceeding 3,2 mV	1,56 mV – 1,71 mV	P
	If the measured value exceeds 3,2 mV, the voltage drop is determined on each individual clamping unit seperately, which shall not exceed 1,6 mV		N

IEC 60 947-7-1 and EN 60 947-7-1			
Clause	Requirement – Test	Result - Remark	Verdict
	voltage drop (mV) after mechanical strength test not exceeding 150% of the value measured before mechanical strength test	1,65 mV – 1,89 mV	P
	minimum cross-section of a flexible conductor (mm ²)	0,5 mm²	—
	test current (A) d.c.	0,6 A	—
	voltage drop (mV) before mechanical strength test not exceeding 3,2 mV	0,70 mV – 0,58 mV	P
	If the measured value exceeds 3,2 mV, the voltage drop is determined on each individual clamping unit separately, which shall not exceed 1,6 mV		N
	voltage drop (mV) after mechanical strength test not exceeding 150% of the value measured before mechanical strength test	0,78 mV – 0,49 mV	P
8.3.4.2	Testing for damage to and accidental loosening of conductor (flexion test) type 2016-1301		
	conductor of the smallest cross-section (mm ²)	0,5 mm² rigid and flexible	—
	number of conductor of the smallest cross-section	1	—
	diameter of bushing hole (mm)	6,4 mm	—
	height between the equipment and the platen (mm)	260 mm	—
	mass at the conductor(s) (kg)	0,3 kg	—
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Pull-out test		
	force (N)	30 N	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	conductor of the rated cross-section (mm ²)	16 mm² rigid and flexible	—
	number of conductor of the rated cross-section	1	—

IEC 60 947-7-1 and EN 60 947-7-1			
Clause	Requirement – Test	Result - Remark	Verdict
	diameter of bushing hole (mm)	13 mm	—
	height between the equipment and the platen (mm)	300 mm	—
	mass at the conductor(s) (kg)	2,9 kg	—
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Pull-out test		
	force (N)	100 N	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	conductor of the largest cross-section (mm ²)	25 mm² flexible	—
	number of conductor of the largest cross-section :	1	—
	diameter of bushing hole (mm)	13 mm	—
	height between the equipment and the platen (mm)	300 mm	—
	mass at the conductor(s) (kg)	4,5 kg	—
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Pull-out test		
	force (N)	135 N	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	conductor of the largest or smallest cross-section (mm ²)		—
	number of conductor of the largest or smallest cross-section		—
	diameter of bushing hole (mm)		—
	height between the equipment and the platen (mm)		—
	mass at the conductor(s) (kg)		—

IEC 60 947-7-1 and EN 60 947-7-1			
Clause	Requirement – Test	Result - Remark	Verdict
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		N
	Pull-out test		
	force (N)		—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		
8.3.4.4	Verification of rated cross section and rated connecting capacity		
	One conductor of the two next smaller cross-sections can be unhindered and connected in each clamping unit of one terminal block (up to 35 mm ²)	6 mm²	P
8.4.2	Verification of clearances and creepage distances		
	Conductor type and conductor cross-section	25 mm² flexible	—
	Conductor end length (mm)	18 – 20 mm	—
	Type of support	Top hat rail 35 mm (EN 50022)	—
8.4.2.2	Clearances		
	Case B (mm)	3 mm	P
	Case A (mm)	8 mm	
	Measured (mm)	14,08 mm	
	Rated impulse withstand voltage	8 kV	P
8.4.2.3	Creepage distances:		
	- pollution degree	3	—
	- comparative tracking index (V)	600 V	—
	- material group	I	—
	- rated insulation voltage Ui (V)	800 V	—
	- minimum creepage distances (mm)	10 mm	—
	- measured creepage distances (mm)	14,68 mm	—
8.4	Verification of electrical characteristics		
8.4.3	Dielectric test		

IEC 60 947-7-1 and EN 60 947-7-1			
Clause	Requirement – Test	Result - Remark	Verdict
	Dielectric test, Uimp indicated:		
	- five terminal blocks connected with unfavourable cross-section (mm ²) /type/ conductor end length (mm)	25 mm², flexible, 18 - 20 mm	—
	- rated impulse withstand voltage (kV)	8 kV	—
	- test Uimp main circuits (kV)	9,8 kV	P
	Dielectric test, Uimp not indicated:		
	- five terminal blocks connected with unfavourable cross-section (mm ²) /type/ conductor end length (mm) :	25 mm², flexible, 18 - 20 mm	—
	- rated insulation voltage (V)	800 V	—
	- test voltage for 5 sec (V)	2000 V	P
8.4.5	Temperature rise test		
	Temperature rise conditions:		
	- test current (A)	76 A	—
	- cross-section of the conductor (mm ²)	16 mm²	—
	- torque (Nm)	-	—
	- temperature rise does not exceed 45 K	25 K – 32 K	P
	Voltage drop before and after temperature rise test:		
	- test current (A) d.c.	7,6 A	—
	- voltage drop (mV) before temperature rise test not exceeding 3,2 mV	1,41 mV – 1,88 mV	P
	If the measured value exceeds 3,2 mV, the voltage drop is determined on each individual clamping unit separately, which shall not exceed 1,6 mV		N
	- voltage drop (mV) after temperature rise test not exceeding 150% of the value measured before temperature rise test	1,39 mV – 1,81 mV	P
8.4.6	Short-time withstand current test		
	- rated cross-section of the conductor (mm ²)	16 mm²	—
	- torque (Nm)	-	—
	- test current (A)	1920 A	—

IEC 60 947-7-1 and EN 60 947-7-1			
Clause	Requirement – Test	Result - Remark	Verdict
	- duration of the test current (s)	1 s	—
	At the end of the test no damage that may impair further use shall have occurred to any part of the terminal block		P
	Voltage drop before and after short-time withstand current test		
	- test current (A) d.c.	7,6 A	—
	- voltage drop (mV) before short-time withstand current test not exceeding 3,2 mV	1,35 mV	P
	If the measured value exceeds 3,2 mV, the voltage drop is determined on each individual clamping unit separately, which shall not exceed 1,6 mV		N
	- voltage drop (mV) after short-time withstand current test not exceeding 150% of the value measured before short-time withstand current test	1,42 mV	P
8.4.7	Ageing test for screwless type terminal block		
	Maximum ambient temperature (°C)	40 °C /	—
	Rated cross-section rigid or stranded < 10 mm ² solid, > 10 mm ² stranded (mm ²)	16 mm²	—
	Heating cabinet is increased, in each cycle to (°C)	40 °C	—
	Test current (A) d.c. for measurement of the voltage drop	7,6 A	—
	Voltage drop after 0 cycles:		
	- requirement: ≤ 3,2 mV (mV)	1 – 2,10 mV 2 – 1,20 mV 3 – 1,60 mV 4 – 2,00 mV 5 – 1,50 mV	P
	If the measured value exceeds 3,2 mV, the voltage drop is determined on each individual clamping unit separately, which shall not exceed 1,6 mV		N

IEC 60 947-7-1 and EN 60 947-7-1			
Clause	Requirement – Test	Result - Remark	Verdict
	Voltage drop after the 24th cycle:		
	- requirement: 4,8 mV (mV)	1 – 2,00 mV 2 – 1,30 mV 3 – 1,60 mV 4 – 2,00 mV 5 – 1,60 mV	P
	Voltage drop after the 48th cycle		
	- requirement: $\leq 4,8$ mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 2,00 mV 2 – 1,30 mV 3 – 1,60 mV 4 – 2,00 mV 5 – 1,60 mV	P
	Voltage drop after the 72th cycle:		
	- requirement: $\leq 4,8$ mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 2,00 mV 2 – 1,30 mV 3 – 1,60 mV 4 – 2,00 mV 5 – 1,60 mV	P
	Voltage drop after the 96th cycle:		
	- requirement: $\leq 4,8$ mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 2,00 mV 2 – 1,30 mV 3 – 1,60 mV 4 – 2,00 mV 5 – 1,60 mV	P
	Voltage drop after the 120th cycle:		
	- requirement: $\leq 4,8$ mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 2,00 mV 2 – 1,30 mV 3 – 1,60 mV 4 – 2,00 mV 5 – 1,60 mV	P
	Voltage drop after the 144th cycle:		

IEC 60 947-7-1 and EN 60 947-7-1			
Clause	Requirement – Test	Result - Remark	Verdict
	- requirement: $\leq 4,8$ mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 2,00 mV 2 – 1,30 mV 3 – 1,60 mV 4 – 2,00 mV 5 – 1,60 mV	P
	Voltage drop after the 168th cycle:		
	- requirement: $\leq 4,8$ mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 2,00 mV 2 – 1,30 mV 3 – 1,60 mV 4 – 2,00 mV 5 – 1,60 mV	P
	Voltage drop after the 192th cycle:		
	- requirement: $\leq 4,8$ mV or 1,5 times the value measured after the 24th cycle (mV)	1 – 2,00 mV 2 – 1,30 mV 3 – 1,60 mV 4 – 2,00 mV 5 – 1,50 mV	P
	Pull-out test		
	force (N)	100 N	—
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
8.5	Verification of thermal characteristics		
	Before the test, the terminal blocks are stored for 24 h in an atmosphere having a temperature between 15°C and 35°C and a relative humidity between 45% and 75%		P
	The flame is applied for 10s. for insulation walls <1 mm and/or an area <100 mm ² , the flame is applied for 5 s.		P
	The terminal blocks are considered to have passed the test if the duration of burning is < 30s in case of ignition. Moreover, the tissue paper on the pinewood board shall not ignite if burning or glowing particles fall from the terminal block.		P
8.6	Verification of EMC characteristics		

IEC 60 947-7-1 and EN 60 947-7-1			
Clause	Requirement – Test	Result - Remark	Verdict
	Subclause 8.4 of IEC 60947-1 applies with the following addition		N
8.6.1	immunity		
	Terminal blocks within the scope of this standard are not sensitive of electromagnetic disturbances and therefore no immunity tests are necessary.		N
8.6.2	Emmision		
	Terminal blocks within the scope of this standard do not generate electomagnetic disturbances and therefore no ission tests are necessary.		N

Remarks

Additional test:

***- The materials were subjected to a ball pressure test according EN 60947-1 at a temperature of 125 °C for insulation materials necessary to retain current carrying parts.
The diameter of the impression caused by the ball was less than the required 2 mm.***

***- Parts of insulation material necessary to retain current carrying parts were subjected to a glow-wire test according EN 60947-1, at 960 °C.
This test withstood well.***

***- The terminal blocks were stored in a humidity cabinet containing air with relative humidity between 91% and 95 %, temperature of air between 20 °C and 30 °C.
After 48 hours the insulation resistance was measured with a d.c. voltage of 500 V for 1 minute.
The resistance was more than the required 2 MΩ, measured > 20 MΩ.***

Remarks

Description of types

type	:	2016 with suffixes -1201, -1202, -1203, -1204, -1205, -1206, -1208, -1209
description	:	two-conductor through terminal block, with screwless-type terminals, 1-pole
type	:	2016-1207
description	:	two conductor earth terminal block, with screwless-type terminals, 1-pole
type	:	2016 with suffixes -1301, -1302, -1303, 1304, -1305, -1306, -1308, -1309
description	:	three conductor through terminal block, with screwless-type terminals, 1-pole
type	:	2016-1307
description	:	three conductor earth terminal block, with screwless-type terminals, 1-pole

Remarks

