



Test Report issued under the responsibility of:



TEST REPORT IEC 61009-1 Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) Part 1: General rules	
Report Number.	3317032.50
Date of issue	2020-06-15
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Name of Testing Laboratory preparing the Report	DEKRA Testing Services (Zhejiang) Co., Ltd.
Applicant's name	GACIA Electrical Appliance Co., Ltd.
Address	No.1 Nanxijiang Road, Daqiao Industrial Zone, Beibaixiang Town, Yueqing, 325603 Zhejiang, China
Test specification:	
Standard	IEC 61009-1:2010, AMD1:2012, AMD2:2013 used in conjunction with IEC 61009-2-1:1991 or IEC 61009-2-2:1991
Test procedure	CB Scheme
Non-standard test method	N/A
Test Report Form No.	IEC61009_1F
Test Report Form(s) Originator ...	OVE
Master TRF	Dated 2019-10-15
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Test item description	Residual current operated circuit-breakers with integral overcurrent protection (RCBO)
Trade Mark	GACIA
Original Product/Equipment Manufacturer	GACIA Electrical Appliance Co., Ltd. No.1 Nanxijiang Road, Daqiao Industrial Zone, Beibaixiang Town, Yueqing, 325603 Zhejiang, China
Branding Manufacturer(s)	-
Model/Type reference	PL8HM, PL8HE, PL8NM, PL8NE, L80M, L80E, L80M-R
Ratings	1P+N, Ue: 230 Vac, 50 Hz In: 6, 10, 16, 20, 25, 32 A, B and C type I Δ n: 30, 100, 300 mA type A and AC, without time-delay Ics = Icn = 6 kA, I Δ m = 3 kA Energy limiting class 3 according to EN 61009-1

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒	CB Testing Laboratory:	DEKRA Testing Services (Zhejiang) Co., Ltd.
Testing location/ address.....:		No.5, Changjiang Road, Great Bridge Industrial Park, North Baixiang, Wenzhou, Zhejiang, 325603, P.R. China
Tested by (name, function, signature).....:		Ray Zhu 
Approved by (name, function, signature)..:		Eric Wang 
☐	Testing procedure: CTF Stage 1:	N/A
Testing location/ address.....:		N/A
Tested by (name, function, signature).....:		N/A
Approved by (name, function, signature)..:		N/A
☐	Testing procedure: CTF Stage 2:	N/A
Testing location/ address.....:		N/A
Tested by (name + signature)		N/A
Witnessed by (name, function, signature) .:		N/A
Approved by (name, function, signature)..:		N/A
☐	Testing procedure: CTF Stage 3:	N/A
☐	Testing procedure: CTF Stage 4:	N/A
Testing location/ address.....:		N/A
Tested by (name, function, signature).....:		N/A
Witnessed by (name, function, signature) .:		N/A
Approved by (name, function, signature)..:		N/A
Supervised by (name, function, signature) :		N/A

List of Attachments (including a total number of pages in each attachment): N/A						
Summary of testing: The following samples were chosen for the type test according to annex A of IEC/EN 61009-1.						
No.	Current (A)	$I_{\Delta n}$ (mA)	Number of poles	Test voltage (Vac)	d.c. components type	Test sequence
1#	C32	30	1P+N	230	A	A1 (only clause 6)
2# - 4#	C32	30	1P+N	230	A	F0
Notes: 1. This report is based on and shall be read in conjunction with test report no. 3307822.50 issued on 2015-09-29. 2. This report is issued due to that: - The address of applicant / manufacturer / factory is changed to "No.1 Nanxijiang Road, Daqiao Industrial Zone, Beibaixiang Town, Yueqing, 325603 Zhejiang, China". - A11: 2015 and A12: 2016 of EN 61009-1:2012 are considered, no actual test is required in these 2 amendments. - The above tests were carried out to verify the compliance. 3. The type references PL8HE, PL8NM, PL8NE, L80M, L80E and L80M-R are identical to PL8HM except model references. All tests are on the model PL8HM. 4. The neutral pole is interrupted without overcurrent protection.						
Testing location: All tests were conducted in: DEKRA Testing Services (Zhejiang) Co., Ltd. No.5, Changjiang Road, Great Bridge Industrial Park, North Baixiang, Wenzhou, Zhejiang, 325603, P.R. China						

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

☒ **The product fulfils the requirements of**

IEC 61009-1:2010 + A1:2012 + A2:2013,
IEC 61009-2-1:1991

EN 61009-1:2012 + A1:2014 + A2:2014 + A11:2015 + A12:2016,
EN 61009-2-1:1994 + A11:1998
test result of EN standard refers to annex 1 of this report.

Statement concerning the uncertainty of the measurement systems used for the tests

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

Procedure number, issue date and title:

☒ **Statement not required by the standard used for type testing**

Copy of marking plate



Test item particulars	Residual current operated circuit-breakers with integral overcurrent protection (RCBO)
Type of RCBO	A and AC
Time delay	Without time-delay
Method of operating	Independent of line voltage
Type of installation	Fixed
Number of poles	1P+N
Protection against external influences	Unenclosed
Method of mounting	Surface / flush / panel board / distribution board
Method of connection	Not associated with the mechanical mounting
Instantaneous tripping current	B and C type
Rated current (I_N)	6, 10, 16, 20, 25, 32 A
Rated residual operating current ($I_{\Delta N}$)	30, 100, 300 mA
Rated voltage (U_N)	230 Vac
Rated impulse withstand voltage (U_{imp})	4 kV
Rated frequency (Hz)	50 Hz
Rated short-circuit capacity (I_{CN})	6 kA
Rated residual making and breaking capacity ($I_{\Delta M}$)	3 kA
Nature of supply	AC
Type of terminal	Screw
Classification of RCBOs functionally dependent on the line voltage:	No
Opening automatically in case of failure of the line voltage:	-
- reclosing automatically when the line voltage is restored	-
- not reclosing automatically when the line voltage is restored	-
Not opening automatically in case of failure of the line voltage	-
- able to trip in a hazardous situation arising on failure of line voltage	-
- not able to trip in a hazardous situation arising on failure of line voltage	-
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	:	2020-05
Date (s) of performance of tests	:	2020-05
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 ☒ comma / ☐ point is used as the decimal separator.		
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60335-1:		
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		☐ Yes ☒ Not applicable
When differences exist; they shall be identified in the General product information section.		
Name and address of factory (ies)	:	GACIA Electrical Appliance Co., Ltd. No.1 Nanxijiang Road, Daqiao Industrial Zone, Beibaixiang Town, Yueqing, 325603 Zhejiang, China
General product information and other remarks:		
The grid distance "a": 45 mm.		

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	TEST SEQUENCE "A₁"	1#: C32, 30 mA, type A Refer to test report no. 3307822.50 except clause 6	--
6.	MARKING (STANDARD MARKING)		--
	RCBO MARKED WITH:		--
	a) Manufacturer's name or trade mark	GACIA	P
	b) Type designation, catalogue number or serial number	PL8HM	P
	c) Rated voltage(s) (V).....	230 V~	P
	d) Rated current without symbol "A" preceded by symbol for instantaneous tripping.....	C32	P
	e) Rated frequency	50 / 60 Hz	P
	f) Rated residual operating current.....	30 mA	P
	g) Settings of residual operating current.....		N/A
	h) Rated short-circuit capacity, in amperes	6000 in a rectangle	P
	j) Reference calibration temperature, if different from 30°C		N/A
	k) Degree of protection		N/A
	l) Position of use		N/A
	m) Rated residual making and breaking capacity, if different from rated short-circuit capacity	3000 A	P
	n) Symbol S for type S.....		N/A
	p) Operating means of test device by letter T.....	T	P
	q) Wiring diagram		P
	r) Operating characteristic in presence of residual currents with d.c. components		--
	- RCBOs of type AC with the symbol		N/A
	- RCBOs of type A with the symbol		P
	s) type D RCBOs, the max. instantaneous tripping current, if higher than 20 I _N		N/A
	Marking on the RCBO itself or on nameplate or nameplates attached to the RCBO and located so that for small devices at least d), f), n), p) and r) (only for type A) is legible when the RCBO is installed	d), f), p) and r) are marked on the front	P

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The information under a), b), c), h), l), r) (only for type AC) and s) may be marked on the side or the back of the device and be visible only before the device is installed	a), b), c), h) and r) are marked on the front	P
	The information under q) may be on the inside of any cover which has to be removed in order to connect the supply wires	q) is marked on the front	P
	Any remaining information not marked shall be given in the manufacturer's catalogues.		P
	The suitability for isolation, which is provided by all circuit-breakers of this standard, may be indicated by the symbol on the device		P
	If a degree of protection higher than IP20 is marked on the device, it shall comply with it, whichever the method of installation. If the higher degree of protection is obtained only by a specific method of installation and/or with the use of specific accessories this shall be specified in the manufacturers literature		N/A
	Open position indicated by "0" and closed position by "I"		P
	For push-buttons the OFF push-button shall either be red and/or marked with "0"		N/A
	If necessary to distinguish between supply and load terminals they shall be clearly marked		N/A
	Terminals for neutral conductor N		P
	Terminal for protective conductor		N/A
	Marking indelible, easy legible and not on removable parts		P
	Labels not easy to remove and no curling. Test acc. to cl. 9.3: 15 s with water and 15 s with hexane		P
	For universal terminals (rigid-solid, rigid-stranded and flexible conductors:		P
	- no markings		P
	For non-universal terminals:		--
	- terminals for rigid-solid conductors only, marked by the letters "s" or "sol"		N/A
	- terminals for rigid (solid and stranded) conductors only, marked by the letter "r"		N/A

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	marking on the RCBO or if the space available is not sufficient, on the smallest package unit or in technical information				P
	TEST SEQUENCE "A₂"	Refer to test report no. 3307822.50			P
	TEST SEQUENCE "B"	Refer to test report no. 3307822.50			P
	TEST SEQUENCE "C"	Refer to test report no. 3307822.50			P
	TEST SEQUENCE "D"	Refer to test report no. 3307822.50			P
	TEST SEQUENCE "E"	Refer to test report no. 3307822.50			P
	TEST SEQUENCE "F0"	C32, 30 mA, type A			--
		2# - 4#			--
9.12	Short-circuits test				--
9.12.11.4	Test above 1500 A				P
b)	Test at service short-circuit capacity I_{cs}				P
	Service short-circuit capacity (A).....	6000 A			--
	Figure	Figure 7			--
	Test voltage 1,05 U_n	243,9 V			--
	Cross-section (mm ²)	10 mm ²			--
	Grid distance a (mm)	45 mm			--
	Prospective current (A)	6000 A			--
	Prospective current obtained (A).....	6094 A			--
	Power factor	0,65~0,7			--
	Power factor obtained	0,69			--
	Sequence	O - O - CO			--
	I_{peak} (A) max. value	2#	3#	4#	--
	L	3,3 kA	3,9 kA	3,8 kA	P

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	Max. $I^2t \leq 52 \text{ kA}^2\text{s}$, acc. EN 61009	2#	3#	4#	--
	L	26,4 kA^2s	38,6 kA^2s	31,2 kA^2s	P
	RCBOs functionally dependent on the line voltage supplied with rated voltage				N/A
	No permanent arcing				P
	No flash-over between poles or between poles and frame				P
	No blowing of fuse				P
	No damage, polyethylene sheet shows no holes				P
9.12.12	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:				P
9.12.12.1.a)	Leakage current across open contacts, according to 9.7.7.3, each pole is supplied at a voltage 1,1 times $U_n = \text{_____ V}$. The RCBO is in the open position	253 V			--
	The leakage current shall not exceed 2 mA	2#	3#	4#	P
	L	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
	N	< 1,4 mA	< 1,4 mA	< 1,4 mA	P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 1500 V				N/A
	e) 2000 V				N/A
	During these test, after the test has carried out under the conditions specified in 9.7.2 a), it shall be verified that the indicating means show the open position and during the test carried out under the conditions specified in 9.7.2 b) the indication means shall show the closed position				P
	Test current equal to 0,85 times the conventional non-tripping current for:	30,7 A			--
	- 1h starting from cold				P
	- 2h				N/A
	Increasing the current within 5s to 1,1 times the conventional tripping current	51,0 A			--

IEC 61009-1					
Clause	Requirement + Test	Result - Remark			Verdict
	- tripping within	2#	3#	4#	--
	- 1h (< 63 A)	101 s	56 s	137 s	P
	- 2h (> 63 A)				N/A
	TEST SEQUENCE "F1"				N/A
	TEST SEQUENCE "G0"	Refer to test report no. 3307822.50			P
	TEST SEQUENCE H	Refer to test report no. 3307822.50			P
	TEST SEQUENCE I	Refer to test report no. 3307822.50			P
	TEST SEQUENCE J	Refer to test report no. 3307822.50			P

IEC 61009-1				
Clause	Requirement + Test		Result - Remark	Verdict
ANNEX A (NORMATIVE)				
Test sequence and number of samples to be submitted for certification purposes Table A.1 - Test sequences				
Test sequence		Clause or subclause	Test (or inspection)	
A	A ₁	6 8.1.1 8.1.2 9.3 8.1.3 8.1.6 9.11 9.4 9.5 9.6 9.14 8.1.3 9.25	Marking General Mechanism Indelibility of marking Clearance and creepage distances (external parts only) Non-interchangeability Trip free mechanism Reliability of screws, current-carrying parts and connections Reliability of terminals for external conductors Protection against electric shock Resistance to heat Clearances and creepage distances (internal parts) Resistance to rusting	
	A ₂	9.15	Resistance to abnormal heat and fire	
B		9.7.7.4 9.7.7.5 ^{a)} 9.7.1 9.7.2 9.7.3 9.7.4 9.7.7.2 9.7.5 9.7.6 9.8 9.22.2 9.23	Resistance of the insulation of open contacts and basic insulation against an impulse voltage in normal conditions Verification of the behaviour of components bridging the basic insulation Resistance to humidity Insulation resistance of the main circuit Dielectric strength of the main circuit Insulation resistance an dielectric strength of auxiliary circuits Verification of clearances with the impulse withstand voltage Secondary circuit of detection transformers Capability of control circuits connected to the main circuits Temperature-rise Reliability at 40°C Ageing of electronic components	
C	C ₁	9.10 9.12.11.2.1 (and 9.12.12)	Mechanical and electrical endurance Performance at reduced short-circuit currents (Verification of the RCBO after short-circuit tests)	
	C ₂	9.12.11.2.2 (and 9.12.12)	Short-circuit test for verifying the suitability of RCBOs for use in IT systems (Verification of the RCBO after short-circuit tests)	
D	D ₀	9.9.1	Operating characteristics under residual current conditions	
	D ₁	9.17 9.19 9.12.13 9.16	Behaviour in case of failure of the line voltage Behaviour in case of surge currents Performance at I _{Δm} Test device	
E	E ₀	9.9.2	Overcurrent operating characteristics	
	E ₁	9.13 9.12.11.3 (and 9.12.12)	Resistance to mechanical shock and impact Short-circuit performance at 1500 A	
F	F ₀	9.12.11.4 b) (and 9.12.12)	Performance at service short-circuit capacity	
	F ₁	9.12.11.4 c) (and 9.12.12.2)	Performance at rated short-circuit capacity	
G		9.22.1	Reliability (climatic tests)	
H ^{a) b)}		IEC 61543 Table 4-T1.1 IEC 61543 Table 4-T1.2 IEC 61543 Table 5-T2.3	Harmonics, inter harmonics Signalling voltages Conducted unidirectional transients of the ms and μs time scale	
I		IEC 61543 Table 5-T2.1 IEC 61543 Table 5-T2.5 IEC 61543 Table 5-T2.2	Conducted sine-wave voltages or currents Radiated electromagnetic field Fast transients (burst)	
J		IEC 61543 Table 5-T2.6 IEC 61543 Table 6-T3.1	Conducted common mode disturbances in the frequency range lower than 150 kHz Electrostatic discharges	
a) This test may be done on separate samples.				
b) For devices containing a continuously operating oscillator, the test of CISPR 14-1 shall be carried out on the samples prior to the tests of this sequence.				

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict

Table A.2 - Number of samples for full test procedure			
Test sequence	Number of samples	Minimum number of accepted samples (a) (b)	number of samples for repeated tests (c)
A ₁	1	1	--
A ₂	3	2	3
B	3	2	3
C ₁	3	2 (d)	3
C ₂	3	2 (d)	3
D	3	2 (d)	3
E	3	2 (d)	3
F ₀	3	2 (d)	3
F ₁	3	2 (d)	3
G	3	2	3
H (e)	3	2	3
I (e)	3	2	3
J (e)	3	2	3
a) In total a maximum of three test sequences may be repeated. b) It is assumed that a sample which has not passed a test has not met the requirements due to workmanship or assembly defects which are not representative of the design. c) In the case of repeated tests, all test results must be acceptable. d) Except for test of 9.12.10, 9.12.11.2, 9.12.11.3, 9.12.11.4, 9.12.13 as appropriate, which all samples shall pass. e) At the manufacturer's request, the same set of samples may be subjected to more than one of these test sequences.			

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict

Table A.3 - Number of samples for simplified test procedure			
Test sequence	Number of samples according to the number of poles ^{a) g)}		
	2-poles ^{b) c)}	3-poles ^{d) f) j)}	4-poles ^{e)}
A ₁	1 max. rating I _N min. rating I _{ΔN}	1 max. rating I _N min. rating I _{ΔN}	1 max. rating I _N min. rating I _{ΔN}
A ₂	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
B	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
C	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
D ₀ + D ₁	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
D ₀	1 for all other ratings of I _{ΔN} with max. I _N		
E ₀ + E ₁	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
E ₀	1 ⁱ⁾ for all other ratings of I _N with min. I _{ΔN}		
F ₀	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
	3 min. rating I _N max. rating I _{ΔN}	3 min. rating I _N max. rating I _{ΔN}	3 min. rating I _N max. rating I _{ΔN}
F ₁	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
	3 min. rating I _N max. rating I _{ΔN}	3 min. rating I _N max. rating I _{ΔN}	3 min. rating I _N max. rating I _{ΔN}
G	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
H ^{k)}	3 ^{h)} samples of the same rating I _N chosen at random min. rating I _{ΔN}		
I	3 ^{h)} samples of the same rating I _N chosen at random min. rating I _{ΔN}		
J	3 ^{h)} samples of the same rating I _N chosen at random min. rating I _{ΔN}		
a)	If a test is to be repeated according to the minimum performance criteria of clause A.2, a new set of samples is used for the relevant test. In the repeated test all test results must be acceptable.		
b)	If only 3-pole or 4-pole RCBOs are submitted, this column shall also apply to a set of samples with the smallest number of poles.		
c)	Also applicable to 1-pole RCBOs with uninterrupted neutral and 2-pole RCBOs with 1 protected pole.		
d)	Also applicable to 3-pole RCBOs with two protected poles		
e)	Also applicable to 3-pole RCBOs with uninterrupted neutral and 4-pole RCBOs with 3 protected poles.		
f)	This column is omitted when 4-pole RCBOs have been tested.		
g)	If only one value of I _{ΔN} is submitted, min. rating I _{ΔN} and max. rating I _{ΔN} are replaced by I _{ΔN} .		
h)	Only the highest number of current paths.		
i)	For this sequence only the test of 9.9.2 is required.		
j)	If a 3-pole RCBO with 4 current paths and a 4-pole RCBO are submitted, then only the 4-pole RCBO is tested, with exception of the test of 9.8 of test sequence B for which both types are submitted to the test.		
k)	If the requirement to test max. rating I _N and minimum rating I _{ΔN} does not cover all the possible range of RCBOs, the minimum I _{ΔN} shall in any case be chosen for the test.		

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Clause	Requirement + Test	Result - Remark	Verdict

Table A.4 - Test sequences for RCBOs having different instantaneous tripping currents			
RCBO type tested first	Test sequences for other RCBO types		
	B-type	C-type	D-type
B-type	---	$(E_0 + E_1) + F$	$(E_0 + E_1) + F$
C-type	$E_0^{a)} + B^{a)}$	---	$(E_0 + E_1) + F$
D-type	$E_0^{a)} + B^{a)}$	$E_0^{a)} + B^{a) b)}$	---

a) For this sequence only the tests of 9.8 and 9.9.2.2 are required.

b) When certification is requested at the same time for B-type, C-type and D-type RCBOs having the same rated short-circuit capacity, only test sequence E0 is required if B-type and D-type samples have been tested.

Table A.5 - Test sequences for RCBOs of different classification according to 4.6			
Test sequence	Number of samples according to the number of poles ^{a)}		
	2-pole ^{b) c)}	3-pole ^{d) f)}	4-pole ^{e)}
$D_0 + D_1$	1 max. rating I_N min. rating $I_{\Delta N}$	1 max. rating I_N min. rating $I_{\Delta N}$	1 max. rating I_N min. rating $I_{\Delta N}$
D_0	1 for all other ratings of $I_{\Delta N}$ with max. $I_{\Delta N}$		

- a) If a test is to be repeated according to the minimum performance criteria of clause A.2, a new set of samples is used for the relevant test. In the repeated test all test results must be acceptable.
- b) If only 3-pole or 4-pole RCBOs are submitted, this column shall also apply to a set of samples with the smallest number of poles.
- c) Also applicable to 1-pole RCBOs with uninterrupted neutral and to 2-pole RCBOs with 1 protected pole.
- d) Also applicable to 3-pole RCBOs with 2 protected poles
- e) Also applicable to 3-pole RCBOs with uninterrupted neutral and to 4-pole RCBOs with 3 protected poles.
- f) This column is omitted when 4-pole RCBOs have been tested.

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	ANNEX B DETERMINATION OF CLEARANCES AND CREEPAGE DISTANCES		--
B.1	General		--
	In determining clearances and creepage distances, it is recommended that the following points should be considered.		P
B.2	Orientation and location of a creepage distance		--
	If necessary, the manufacturer shall indicate the intended orientation of the equipment or component in order that creepage distances be not adversely affected by the accumulation of pollution for which they were not designed.		P
B.3	Creepage distances where more than one material is used		--
	A creepage distance may be split in several portions of different materials and/or have different pollution degrees if one of the creepage distances is dimensioned to withstand the total voltage or if the total distance is dimensioned according to the material having the lowest CTI.		P
B.4	Creepage distances split by floating conductive part		--
	A creepage distance may be split into several parts, made with insulation material having the same CTI, including or separated by floating conductors as long as the sum of the distances across each individual part is equal or greater than the creepage distance required if the floating part did not exist. The minimum distance X for each individual part of the creepage distance is given in IEC 60664-1:2007, 6.2 (see also Example 11 in Figure B.1).		P
B.5	Measurement of creepage distances and clearances		--
	In determining creepage distances according to IEC 60664-1, the dimension X , specified in the following examples, has a minimum value of 1,0 mm for pollution degree 2.		P
	If the associated clearance is less than 3 mm, the minimum dimension X may be reduced to one third of this clearance.		P
	The methods of measuring creepage distances and clearances are indicated in Figure B.1. These cases do not differentiate between gaps and grooves or between types of insulation.		P
	The following assumptions are made:		P
	- any recess is assumed to be bridged with an insulating link having a length equal to the specified width X and being placed in the most unfavourable position (see Example 3);		P
	- where the distance across a groove is equal to or larger than the specified width X , the creepage distance is measured along the contours of the groove (see Example 2);		P
	- creepage distances and clearances measured between parts which can assume different positions in relation to each other, are measured when these parts are in their most unfavourable position.		P

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	ANNEX C ARRANGEMENT FOR THE DETECTION OF THE EMISSION OF IONIZED GASES DURING SHORT-CIRCUIT TESTS		--
	The device under test is mounted as shown in figure C.1, which may require adapting to the specific design of the device, and in accordance with the manufacturer's instructions.		P
	When required (i.e. during "O" operations), a clear polyethylene sheet ($0,05 \pm 0,01$) mm thick, of a size at least 50 mm larger, in each direction, than the overall dimensions of the front face of the device but not less than 200 mm × 200 mm, is fixed and reasonably stretched in a frame, placed at a distance of 10 mm from		P
	– either the maximum projection of the operating means of a device without recess for the operating means;		P
	– or the rim of a recess for the operating means of a device with recess for the operating means.		P
	The sheet should have the following physical properties: Density at 23 °C: $0,92 \pm 0,05$ g/cm ³ Melting-point: 110 °C – 120 °C.		P
	When required, a barrier of insulating material, at least 2 mm thick, is placed, as shown in figure C.1, between the arc vent and the polyethylene sheet to prevent damage of the sheet due to hot particles emitted from the arc vent.		P
	When required, a grid (or grids) according to figure C.2 is (are) placed at a distance of "a" mm from each arc vent side of the device.		P
	The grid circuit (see figure C.3) shall be connected to the points B and C (see figures 7 or 8, as applicable).		P
	The parameters for the grid circuit are as follows:		P
	Resistor R': 1,5 Ω		P
	Copper wire F': length 50 mm, and diameter as required in 9.12.9.1.		P

IEC 61009-1			
Clause	Requirement + Test	Result - Remark	Verdict
	ANNEX D ROUTINE TESTS		--
	ANNEX E SPECIAL REQUIREMENTS FOR AUXILIARY CIRCUITS FOR SAFETY EXTRA-LOW VOLTAGE		--
	ANNEX F COORDINATION BETWEEN RCBOs AND SEPARATE FUSES ASSOCIATED IN THE SAME CIRCUIT		--
	ANNEX G Additional requirements and tests for RCBOs consisting of a circuit-breaker and a residual current unit designed for assembly on site		--
	ANNEX J Particular requirements for RCBOs with screwless type terminals for external copper conductors		--
	ANNEX K Particular requirements for RCBOs with flat quick-connect terminations		--
	ANNEX L Specific requirements for RCBOs with screw-type terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors		--

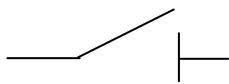
IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

Annex 1:

ATTACHMENT TO TEST REPORT IEC 61009-1 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs)	
Differences according to..... :	EN 61009-1:2012+A1:2014+A2:2014+A11:2015+A12:2016 used in conjunction with EN 61009-2-1:1994 + A11:1998
Attachment Form No. :	EU_GD_IEC61009_1F
Attachment Originator	ÖVE
Master Attachment	Dated 2020-05-08
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	CENELEC COMMON MODIFICATIONS (EN)		--
	GENERAL		--
9.12	Short circuit tests	Refer to test report no. 3307822.50	--
9.12.3	Value of power frequency recovery voltage shall be equal to 110% of the rated voltage		--
9.12.4	Tolerances and test quantities		--
	voltage (including recovery voltage): 0, -5%		--
	TEST SEQUENCE "A₁"		--
6	MARKING (REPLACE CLAUSE 6 BY)		--
6.Z1	STANDARD MARKING		--
	Each RCBO shall be marked in a durable manner according to the following Table Z3.		P
	RCBO MARKED WITH:		--
a)	The manufacturer's name or trademark	GACIA	P
b)	Type designation, catalogue number or serial number	PL8HM	P
c)	Rated voltage(s) with the symbol ~	230 V~	P
d)	Rated current without symbol "A", preceded by the symbol of overcurrent instantaneous tripping (B, C or D), for example B16	C32	P
e)	Rated frequency, if the RCBO is designed for	50 / 60 Hz	P

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	frequencies other than 50Hz (see 5.3.5)		
f)	Rated residual operating current ($I_{\Delta n}$) in A or in mA	30 mA	P
h)	Rated short circuit capacity, in amperes in a rectangle without symbol "A"	6000 within a rectangle	P
j)	Reference calibration temperature, if different from 30°C		N/A
k)	The degree of protection (only if different from IP20)		N/A
l)	The position of use, if necessary		N/A
m)	Rated residual making and breaking capacity ($I_{\Delta m}$), if different from rated short-circuit capacity (I_{cn})	3000 A	P
n)	The symbol S (S in a square) for type S devices		N/A
o)	symbol of the method of operation according to Table Z1 of 4.1 if the RCBO is functionally dependent on the line voltage		N/A
q)	Operating means of the test device, by the letter T	T	P
r)	Wiring diagram unless the correct mode of operation is evident		P
s)	Operating characteristic in presence of residual currents with d.c. components		--
	- RCBOs of type AC with the symbol 		N/A
	- RCBOs of type A with the symbol 		P
t)	Energy limiting class (e.g. 3) in a square in accordance with Annex ZD if applied	3 within a rectangle	P
u)	RCBOs according to 4 Z1 marked with the symbol (snowflake enclosing -25)	snowflake enclosing -25	P
v)	Indication of the terminal for the neutral with "N"		P
w)	Additional marking of performance to other standards or additional requirements according to 6.Z2		N/A
	RCBO's other than operated by means of push button, open position indicated by "0" and closed position by "I"		P
	Additional national symbols are allowed Provisionally the use of national indications only is allowed These indication visible when RCBO is installed		N/A

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	For push-buttons the OFF push-button shall either be red and/or marked with "O"		N/A
	RED shall not be used for any other push-button		N/A
	If a push-button is used for closing the contacts and is evidently identified as such, its depressed position is sufficient to indicate the closed position.		N/A
	If a single push-button is used for closing and opening the contacts and is identified as such, the button remaining in its depressed position is sufficient to indicate the closed position. On the other hand, if the button does not remain depressed, an additional means indicating the position of the contacts shall be provided.		N/A
	If necessary to distinguish between supply and load terminals they shall be clearly marked		N/A
	Terminals for neutral circuit N		P
	Terminal for protective conductor		N/A
	If a degree of protection higher than IP20 is marked on the device, it shall comply with it, whichever the method of installation. If the higher degree of protection is obtained only by a specific method of installation and/or with the use of specific accessories this shall be specified in the manufacturers literature		N/A
	The suitability for isolation, which is provided by all circuit-breakers of this standard, may be indicated by the symbol on the device		P
	The base for plug-in RCBOs shall be marked with the following:		N/A
	- rated current or maximum rated current		N/A
	- trade mark		N/A
	Marking indelible, easy legible and not on removable parts		P
	Labels not easy to remove and no curling. Test acc. to cl. 9.3: 15 s with water and 15 s with hexane		P
	For universal terminals (rigid-solid, rigid-stranded and flexible conductors):		P
	- no markings		P
	For non-universal terminals:		N/A
	- terminals for rigid-solid conductors only, marked by the letters "s" or "sol"		N/A

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	- terminals for rigid (solid and stranded) conductors only, marked by the letter "r"		N/A
	marking on the RCBO or if the space available is not sufficient, on the smallest package unit or in technical information		P
6.Z2	Additional marking		--
	Additional marking to other standards (EN or IEC or other) or additional requirements are allowed under the following conditions:		N/A
	- The RCBO shall comply with all the requirements of the additional standard.		N/A
	- The relevant standards to which the additional marking refers shall be indicated adjacent to this marking and shall be clearly differentiated or separated from the standard marking according to 6.Z.1.		N/A
	Compliance is checked by inspection and by carrying out all the test sequences required by the relevant standard. Equivalent or less severe test sequences need not be repeated.		N/A
8.	Requirements for construction and operation		--
8.1	Mechanical design	Refer to test report no. 3307822.50	--
8.1.1	General		--
modify:	Not possible to alter the operating characteristics by means of external interventions of the residual operating current.		P
modify:	It shall not be possible to disable or inhibit the RCBO function by any means. NOTE In Australia, Germany, Denmark, Italy, the UK and Switzerland, multiple settings are not allowed.		P
delete:	In case of an RCBO having multiple settings of residual operating current, the rating refers to the highest setting.		N/A
8.1.5	Terminals for external conductors		--
8.1.5.1	In this standard, only terminals for copper conductors are considered		N/A
modify:	Compliance is checked by inspection and by the tests as relevant for the type of connection:		P
	9.5 for screw-type terminals		P
	by specific tests for plug-in or bolt-on RCBOs included in the standard		N/A

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	by the tests of Annexes J or K		N/A
8.1.5.2 delete:	or terminals for external untreated aluminium conductors and with aluminium screw type terminals for use with copper or with aluminium conductors according to Annex L.		N/A
8.1.Z1	Mechanical mounting of plug-in type RCBOs		N/A
	The mechanical mounting of plug-in type RCBOs shall be reliable and have adequate stability		N/A
8.1.Z1.1	Plug-in type RCBOs, the holding in position of which does not depend solely on their plug-in connection(s)		N/A
	Compliance of the mechanical mounting is checked by the relevant tests of 9.13		N/A
8.1.Z1.2	Plug-in type RCBOs, the holding in position of which depends solely on their plug-in connection(s)		N/A
	Compliance of the mechanical mounting is checked by the relevant tests of 9.13		N/A
	TEST SEQUENCE "A2"		--
9.14 add:	Small parts, where each surface lies completely within a circle of 15 mm diameter, or where any part of the surface lies outside a 15 mm diameter circle and it is not possible to fit a circle of 8 mm diameter on any of the surfaces, are not subjected to the test of this subclause (see Figure Z7 for diagrammatic representation).	Refer to test report no. 3307822.50	P
	TEST SEQUENCE "B"		--
8	REQUIREMENTS FOR CONSTRUCTION AND OPERATION		--
8.3	Dielectric properties and isolating capability		--
	RCBOs have adequate dielectric properties	Refer to test report no. 3307822.50	P
9.7	Test of dielectric properties and isolating capability		--
9.7.7.4.1 modify:	rated impulse withstand voltage [kV]:	4 kV	P
	see level of test laboratory [m]	Sea level	P
	test voltage (acc. Table 28) [kV]:	6,2 kV	--
9.7.1.4	The samples show no damage		P
9.7.7.4.3	RCBO in closed position		P

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	All components bridging the basic insulation disconnected	No components bridging the basic insulation			N/A
	A first series of tests is made applying the impulse voltage between the phase pole(s) and the neutral pole (or path) connected together and the metal support connected to the terminal(s) intended for the protective conductor(s), if any				P
	A second series of tests is made applying the impulse voltage between the phase pole(s), connected together, and the neutral pole (or path) of the RCBO				P
9.7.2	Insulation resistance of the main circuit measured between 30 and 60 min after this treatment with 500 V DC after 5 s:				--
	a) between the terminals which are electrically connected together when the RCBO is in the closed position $\geq 2 \text{ M}\Omega$				P
	b) between each pole and the others connected together (electronic components, connected between poles being disconnected) $\geq 2 \text{ M}\Omega$				P
	c) with the RCCB in the closed position, between all poles connected together and the frame, including a metal foil in contact with the outer surface of the housing of insulation material but with the terminal area kept free $\geq 5 \text{ M}\Omega$				P
	d) between the frame and a metal foil in contact with the inner surface of the lining of insulating material $\geq 5 \text{ M}\Omega$				N/A
9.7.3	Dielectric strength of the main circuit measured with an AC voltage (45-65Hz) for 1 min:				--
	a) 2000 V				P
	b) (electronic components, connected between poles being disconnected) 2000 V				P
	c) 2000 V				P
	d) 2500 V				N/A
	No flashover or breakdown				P
9.7.7.2	A first series of tests is made applying the impulse voltage between the phase pole(s) and the neutral pole (or path) connected together and the metal support connected to the terminal(s) intended for the protective conductor(s), if any				N/A

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	A second series of tests is made applying the impulse voltage between the phase pole(s), connected together, and the neutral pole (or path) of the RCBO		N/A
	TEST SEQUENCE "C"		--
	TESTS C1		--
8	REQUIREMENTS FOR CONSTRUCTION AND OPERATION		--
8.6	Mechanical and electrical endurance		--
	RCBOs shall be capable of performing an adequate number of mechanical and electrical operations.	Refer to test report no. 3307822.50	P
9.10.3 modify:	After test:		--
	a)		P
	b)		P
	c)		P
	d)		N/A
9.12.11.2	Test at reduced short-circuit current	Refer to test report no. 3307822.50	--
9.12.11.2.1	Test on all RCBOs		P
modify:	Each overcurrent protected pole tested at a voltage of (105) 110% of the rated phase to neutral voltage		P
add:	Phases which do not carry the short circuit current during this test shall be connected to the supply voltage at the terminals		P
	The measurement of the breaking time shall be carried out at every test and the values shall comply with the values of Table 2.		P
9.12.12.1.b)	Dielectric strength test:		--
modify:	Test voltage:		--
	a) 1500 V		P
	b) 1500 V		P
	c) 1500 V		P
	d) 2000 V		N/A
	TESTS "C2"		--

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
9.12.11.2.2	Short circuit test on rcbos for verifying their suitability for use in it systems	Refer to test report no. 3307822.50			P
modify:	test voltage 105% of 400V				P
	test voltage 105% of 230V for the pole marked N, if any				P
9.12.12.1.b)	Dielectric strength test:				--
	Test voltage:				--
	a) 1500 V				P
	b) 1500 V				P
	c) 1500 V				P
	d) 2000 V				N/A
	TEST SEQUENCE "D"	Refer to test report no. 3307822.50			--
	TEST D0				--
9.9.1 delete:	For multiple settings of IΔn tests are made for each setting	Refer to test report no. 3307822.50			P
	TEST D1				--
8	requirements for construction and operation				--
8.12	RCBOs functionally dependent on line voltage				--
	RCBOs functionally dependent on the line voltage operate correctly between 0,85 and 1,1 UN				N/A
9.17	Verification of the behaviour of RCBOs opening automatically in case of failure of the line voltage				--
9.17.1 replace by:	Limiting value of the line voltage Ux				N/A
	UN applied to the line terminals and progressively lowered to attain zero within about 30s until automatic opening occurs	[V]	[V]	[V]	--
					N/A
	All values less than 0,7 UN				N/A
	Tripping test:				N/A
	Test voltage (V)	V			--
	Residual current 1,25.IΔN	1,25.IΔN = A			--
	Time corresponding to value for IΔN in table 2	[ms]	[ms]	[ms]	--
	No value exceeds the specified limiting values				N/A

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	Not possible to close the apparatus by manual operating means below U_x				N/A
9.17.2 replace by:	Verification of behaviour in case of failure of the line voltage				N/A
	RCBO supplied with UN and line voltage, then switched off				N/A
	Time interval between switching off and opening of the main contacts:	[ms]	[ms]	[ms]	--
a)	RCBOs opening without delay				N/A
	- no value exceeds 0,5 s				N/A
	- no tripping shall occur if the voltage is switched off for a time not exceeding 0,03 s				N/A
b)	RCBOs opening with delay				N/A
	Values within the range indicated by manufacturer	to		ms	N/A
	RCBOs classified 4.1.2.1b): switch off at U_N				N/A
	Voltage off and on at the line side:				N/A
	No automatically closing				N/A
9.17.4 replace by:	Verification of the correct operation of RCBOs with 3 or 4 poles, neutral and one line terminal only being energized in turn (replace the title by)				N/A
9.12.13	DELETE				--
8.11 REPLACE BY:	Test device				--
	RCBOs provided with a test device				P
	RCBOs with rated residual current of 30mA:				P
	Ampere-turns produced when operating the test device do not exceed 1,66 times the ampere turns produced by $I_{\Delta N}$	Refer to test report no. 3307822.50			P
	RCBOs with rated residual current other than 30mA:				P
	Ampere-turns produced when operating the test device do not exceed 2,5 times the ampere turns produced by $I_{\Delta N}$	Refer to test report no. 3307822.50			P
	Not possible to energize the circuit on the load side by operating the test device when the RCBO is in the open position				P
	TEST SEQUENCE "E"				--
	Tests E0				--

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test			Result - Remark	
9.9	VERIFICATION OF THE OPERATING CHARACTERISTICS				--
9.9.2.2 b)	☒ B	Refer to test report no. 3307822.50			P
modify:	Test current 3 IN starting from cold.....:	3 IN = A			--
	Opening time:	[s]	[s]	[s]	--
	- 0,1 < t < 45s (IN≤32A)				P
	- 0,1 < t < 90s (IN>32A)				N/A
	Test current 5 IN starting from cold.....:	5 IN = A			--
		[s]	[s]	[s]	--
	- Tripping time less than 0,1 s				P
c)	☒ C	Refer to test report no. 3307822.50			P
	Test current 5 IN starting from cold.....:	5 IN = A			--
	Opening time:	[s]	[s]	[s]	--
	- 0,1 < t < 15s (IN≤32A)				P
	- 0,1 < t < 30s (IN>32A)				N/A
	Test current 10 IN starting from cold.....:	10 IN = A			--
		[s]	[s]	[s]	--
	- Tripping time less than 0,1 s				P
d)	☐ D				N/A
	Test current 10 IN starting from cold.....:	10 IN = A			--
	Opening time:	[s]	[s]	[s]	--
	0,1 < t < 4s**) (IN≤32A)				N/A
	**) for IN≤10A, t < 8s is permitted				
	- 0,1 < t < 8s (IN>32A)				N/A
	Test current 20 IN starting from cold.....:	20 IN = A			--
		[s]	[s]	[s]	--
	- Tripping time less than 0,1 s				N/A
add: 9.9.2.Z1	Test of effect of single phase loading on the over-current tripping characteristic of RCBO with three or four current path				--
	The test does not apply to RCBOs obtained by assembly of an adaptable residual current unit on a circuit-breaker.				N/A
	RCBOs with three or four current paths are loaded on 2 current paths.				N/A

IEC61009_1F - ATTACHMENT					
Clause	Requirement + Test	Result - Remark			Verdict
	Where a switched neutral pole exists, the test circuit shall include the neutral pole.				N/A
	Except for the neutral pole if applicable, the test is carried out on different poles for each sample.				N/A
	Test current 1,2 times the conventional tripping current, starting from cold				N/A
	Tripping:	[min]	[min]	[min]	--
	- 1 h				N/A
	- 2 h				N/A
	Tests E1				--
9.13 replace by:	Mechanical stresses (replace the title by)				--
9.13.2 replace by:	Resistance to mechanical stresses and impact (replace the title by)	Refer to test report no. 3307822.50			--
	- 9.13.2.2 for RCBOs intended to be mounted on a rail and for all types of plug-in RCBOs designed for surface mounting				P
	- 9.13.2.3 for plug-in type RCBOs, the holding in position of which depends solely on their connections				N/A
9.13.2.2 add:	Plug-in RCBOs designed for surface mounting are mounted complete with the appropriate means for the plug-in connection but without cables being connected and without any cover-plate				N/A
	- downward vertical force of 50 N for 1 min				N/A
	- upward vertical force of 50 N for 1 min				N/A
	RCBO shall not become loose during test and shall not show any damage impairing its further use				N/A
9.13.2.3 replace by:	RCBOs of plug-in type (replace the note by)				N/A
	Plug-in type RCBOs, the holding in position of which depends solely on their connections, are mounted, complete with the appropriate plug-in base but without cables being connected and without any cover-plate, on a vertical rigid wall				N/A
	A force of 20N is applied to the RCBO portion at a point equidistant between the plug-in connections, without jerks for 1 min				N/A
	During this test the RCBO portion shall not become loose and shall not move from the base portion and after the test both portions shall show no damage impairing their further use				N/A

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
9.12.11.3	Test at 1500 A:	Refer to test report no. 3307822.50	P
9.12.12.1.b) replace by:	The RCBO shall show no damage impairing their further use and shall be capable without maintenance to withstand the following tests:		--
	Dielectric strength test:		--
	Test voltage:		--
	a) 1500 V		P
	b) 1500 V		P
	c) 1500 V		P
	d) 2000 V		N/A
	TEST SEQUENCE "F0"	Refer to main part of this report and test report no. 3307822.50	P
	TEST SEQUENCE "F1"		N/A
<i>modify:</i>	TEST SEQUENCE "G0"	Refer to test report no. 3307822.50	P
	TEST SEQUENCE "G1" (add the new test sequence)	Refer to test report no. 3307822.50	P

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

replace table A.1 by:ANNEX A (NORMATIVE)			
Test sequence and number of samples to be submitted for certification purposes			
Table A.1 - Test sequences			
Test sequence		Clause or subclause	Test (or inspection)
A		6	Marking
		8.1.1	General
		8.1.2	Mechanism
		9.3	Indelibility of marking
		8.1.3	Clearance and creepage distances (external parts only)
		8.1.6	Non-interchangeability
		9.11	Trip free mechanism
		9.4	Reliability of screws, current-carrying parts and connections
		9.5	Reliability of terminals for external conductors
		9.6	Protection against electric shock
		9.14	Resistance to heat
		8.1.3	Clearances and creepage distances (internal parts)
		9.15	Resistance to abnormal heat and to fire
B		9.7.7.4	Resistance of the insulation of open contacts and basic insulation against an impulse voltage in normal conditions
		9.7.7.5 a)	Verification of the behaviour of components bridging the basic insulation
		9.7.1	Resistance to humidity
		9.7.2	Insulation resistance of the main circuit
		9.7.3	Dielectric strength of the main circuit
		9.7.4	Insulation resistance and dielectric strength of auxiliary circuits
		9.7.7.2	Verification of clearances with the impulse withstand voltage
		9.7.5	Secondary circuit of detection transformers
		9.7.6	Capability of control circuits connected to the main circuits
		9.8	Temperature-rise
		9.22.2	Reliability at 40°C
		9.23	Ageing of electronic components
C	C ₁	9.10 9.12.11.2.1 (and 9.12.12)	Mechanical and electrical endurance Performance at reduced short-circuit currents (Verification of RCBO after short-circuit test)
	C ₂	9.12.11.2.2 (and 9.12.12)	Short-circuit test for verifying the suitability of RCBOs for use in IT systems (Verification of the RCBO after short-circuit tests)
D	D ₀	9.9.1	Operating characteristics under residual current conditions
	D ₁	9.17	Behaviour in case of failure of the line voltage
		9.19 9.16	Behaviour in case of surge currents Test device
E	E ₀	9.9.2	Overcurrent operating characteristics
	E ₁	9.13	Resistance to mechanical stresses
		9.12.11.3 (and 9.12.12)	Short-circuit performance at 1500 A (Verification of RCBO after short-circuit test)
F	F ₀	9.12.11.4 b) (and 9.12.12)	Performance at service short-circuit capacity (Verification of RCBO after short-circuit test)
	F ₁	9.12.11.4 c) (and 9.12.12.2)	Performance at rated short-circuit capacity (Verification of RCBO after short-circuit test)
	F ₂	9.12.11.4 d) (and 9.12.12.2)	Performance at I _{ΔM} (Verification of RCBO after short-circuit test)
G ₀		9.22.1	Reliability (climatic tests)
G ₁		9.Z.1	Verification of correct operation at low ambient air temperature of RCBOs operating at temperatures between -25°C and +40°C
H a) b)		IEC 61543 Table 4-T1.1 IEC 61543 Table 4-T1.2 IEC 61543 Table 5-T2.3	Harmonics, interharmonics Signalling voltage Conducted unidirectional transients of the ms and μs time scale
I		IEC 61543 Table 5-T2.1 IEC 61543 Table 5-T2.5 IEC 61543 Table 5-T2.2	Conducted sine-wave voltages or currents Radiated high-frequency phenomena Fast transients (burst)
J		IEC 61543 Table 5-T2.6 IEC 61543 Table 6-T3.1	Conducted common mode disturbances in the frequency range lower than 150 kHz Electrostatic discharges
a) For devices containing a continuously operating oscillator, the test of CISPR 14-1 shall be carried out on the samples prior to the tests of this sequence.			
b) For devices containing a continuously operating oscillator, the test of CISPR 14-1 shall be carried out on the samples prior to the tests of this sequence.			

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

<i>replace table A.2 by:</i>			
Table A.2 - Number of samples for full test procedure			
Test sequence	Number of samples	Minimum number of samples which shall pass the test (a) (b)	Maximum number of samples for repeated tests (c)
A ₁	1	1	--
A ₂	3	2	3
B	3	2	3
C ₁	3	2 (d)	3
C ₂	3	2 (d)	3
D	3	2 (d)	3
E	3	2 (d)	3
F ₀	3	2 (d)	3
F ₁	3	2 (d)	3
F ₂	3	2 (d)	3
G ₀	3	2	3
G ₁	3	2	3
H (e)	3	2	3
I (e)	3	2	3
J (e)	3	2	3
a) In total a maximum of three test sequences may be repeated. b) It is assumed that a sample which has not passed a test has not met the requirements due to workmanship or assembly defects which are not representative of the design. c) In the case of repeated tests, all test results must be acceptable. d) Except for test of 9.12.10, 9.12.11.2, 9.12.11.3, 9.12.11.4 as appropriate, which all samples shall pass. e) At the manufacturer's request, the same set of samples may be subjected to more than one of these test sequences.			

IEC61009_1F - ATTACHMENT

Clause	Requirement + Test	Result - Remark	Verdict
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replace table A.3 by:			
Table A.3 - Number of samples for simplified test procedure			
Test sequence	Number of samples according to the number of poles ^{a) g)}		
	2-poles ^{b) c)}	3-poles ^{f) j)}	4-poles ^{e)}
A ₁	1 max. rating I _N min. rating I _{ΔN}	1 max. rating I _N min. rating I _{ΔN}	1 max. rating I _N min. rating I _{ΔN}
A ₂	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
B	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
C ₁	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
C ₂	for 2 protected poles 2 max. rating I _N min. rating I _{ΔN} for one protected pole 3 max. rating I _N min. rating I _{ΔN}	1 max. rating I _N min. rating I _{ΔN}	1 max. rating I _N min. rating I _{ΔN}
D ₀ + D ₁	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
D ₀	1 for all other ratings of I _{ΔN} with max. I _N		
E ₀ + E ₁	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
E ₀	1 ⁱ⁾ for all other ratings of I _N with min. I _{ΔN}		
F ₀	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}
F ₁	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}
F ₂	3 ^{h)} max. rating I _N min. rating I _{ΔN}	3 ^{h)} max. rating I _N min. rating I _{ΔN}	3 ^{h)} max. rating I _N min. rating I _{ΔN}
G ₀	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN}
G ₁ ^{h)}	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}	3 max. rating I _N min. rating I _{ΔN} 3 min. rating I _N max. rating I _{ΔN}
H ^{k)}	3 ^{h)} samples of the same rating I _N chosen at random min. rating I _{ΔN}		
I	3 ^{h)} samples of the same rating I _N chosen at random min. rating I _{ΔN}		
J	3 ^{h)} samples of the same rating I _N chosen at random min. rating I _{ΔN}		
a) the	If a test is to be repeated according to the minimum performance criteria of clause A.2, a new set of samples is used for the relevant test. In repeated test all test results must be acceptable.		
b)	If only 3-pole and/or 4-pole RCBOs are submitted, this column shall also apply to a set of samples with the smallest number of poles.		
c)	Also applicable to 2-pole RCBOs with 1 protected pole.		
d)	Void		
e)	Also applicable to 4-pole RCBOs with 3 protected poles.		
f)	This column is omitted when 4-pole RCBOs have been tested.		
g)	If only one value of I _{ΔN} is submitted, min. rating I _{ΔN} and max. rating I _{ΔN} are replaced by I _{ΔN} .		
h)	Only the highest number of current poles.		
i)	For this sequence only the test of 9.9.2 is required.		
j)	If a 4-pole RCBO with 3 protected poles and a 4-pole RCBO are submitted, then only the 4-pole RCBO is tested, with exception of the test of 9.8 of test sequence B for which both types are submitted to the test.		
k)	If the requirement to test max. rating I _N and minimum rating I _{ΔN} does not cover all the possible range of RCBOs, the minimum I _{ΔN} shall in any case be chosen for the test.		

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

<i>replace table A.4 by:</i>			
Table A.4 - Test sequences for RCBOs having different instantaneous tripping currents			
RCBO type tested first	Test sequences for other RCBO types		
	B-type	C-type	D-type
B-type	---	$(E_0 + E_1) + F$	$(E_0 + E_1) + F$
C-type	$E_0^{a)} + B^{a)}$	---	$(E_0 + E_1) + F$
D-type	$E_0^{a)} + B^{a)}$	$E_0^{a)} + B^{a) b)}$	---
a) For sequence B, only the test of 9.8 shall be performed on 3 samples of maximum rating I_n with minimum rating $I_{\Delta N}$. For sequence E_0, only the test 9.9.2.2 shall be performed on one sample of all ratings I_n with minimum rating $I_{\Delta N}$. b) When certification is requested at the same time for B-type, C-type and D-type RCBOs having the same rated short-circuit capacity, only test sequence E_0 is required if B-type and D-type samples have been tested.			
<i>replace table A.5 by:</i>			
Table A.5 - Test sequences for RCBOs of different classification according to 4.6			
Test sequence	Number of samples according to the number of poles ^{a)}		
	2-pole ^{b) c)}	3-pole ^{f)}	4-pole ^{e)}
$D_0 + D_1$	1 max. rating I_N min. rating $I_{\Delta N}$	1 max. rating I_N min. rating $I_{\Delta N}$	1 max. rating I_N min. rating $I_{\Delta N}$
D_0	1 for all other ratings of $I_{\Delta N}$ with max. $I_{\Delta N}$		
a) If a test is to be repeated according to the minimum performance criteria of clause A.2, a new set of samples is used for the relevant test. In the repeated test all test results must be acceptable. b) If only 3-pole and/or 4-pole RCBOs are submitted, this column shall also apply to a set of samples with the smallest number of poles. c) Also applicable to 2-pole RCBOs with 1 protected pole. d) Void e) Also applicable to 4-pole RCBOs with 3 protected poles. f) This column is omitted when 4-pole RCBOs have been tested.			

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

	ANNEX E SPECIAL REQUIREMENTS FOR AUXILIARY CIRCUITS FOR SAFETY EXTRA-LOW VOLTAGE*)		--
<i>add:</i> (additional)	*) For auxiliary contact units assembled or to be assembled separately to RCBO, see EN 62019		--

	replace ANNEX F by:		
	ANNEX F (INFORMATIVE) CO-ORDINATION UNDER SHORT CIRCUIT CONDITIONS BETWEEN A RCBO AND ANOTHER SHORT CIRCUIT PROTECTIVE DEVICE (SCPD) ASSOCIATED IN THE SAME CIRCUIT		--
	The information given in Annex D of IEC 60898-1:2002 to ensure coordination between circuit-breakers and separate fuses associated in the same circuit may also be applicable to ensure coordination between RCBOs and separate fuses associated in the same circuit.		P

	replace Annex G by:		N/A
G	ANNEX G Additional requirements and tests for RCBOs consisting of a circuit-breaker and a residual current unit designed for assembly on site		N/A

	ANNEX J Particular requirements for RCBOs with screwless type terminals for external copper conductors		N/A
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	ANNEX K Particular requirements for RCBOs with flat quick-connect terminations		N/A
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	ANNEX L Specific requirements for RCBOs with screw-type terminals for external untreated aluminium conductors and with aluminium screw-type terminals for use with copper or with aluminium conductors		N/A
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IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

	ANNEX ZB Special national conditions	N/A
Germany	The use of RCBOs of type AC is not permitted	N/A
Switzerland	The use of RCBOs of type AC is not permitted	N/A
Ireland	For RCBOs functionally dependant on line voltage IEC 61009-2-2 applies in conjunction with Part 1	N/A
	In Ireland, where neutrals are reliably at earth potential, RCBOs with unswitched neutral current paths are permitted for use in accordance with The National Rules For Electrical Installations. The requirements of these types of devices are given in the original text of IEC 61009-1.	N/A
United Kingdom	In the United Kingdom, where neutrals are reliably at earth potential, RCBOs with unswitched neutral current paths are permitted. The requirements of these types of devices are given in the original text of IEC 61009-1.	N/A

	ANNEX ZC A-deviations	N/A
Austria	Table Z1 is not valid in Austria	N/A

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

	ANNEX ZD	P																																																																												
	Classification of RCBOs Type B and C up to and including 63A into energy limiting classes	P																																																																												
	RCBOs of B-type and C-type up to and including 63A, shall be classified into energy limiting classes 1 or 3 in accordance with tables ZD.1 or ZD.2, as applicable, and be marked with the number of the energy limiting class in a square adjoining the symbol given in t) of clause 6. This classification shall not be applied to RCBOs type D and to RCBOs with rated current higher than 63A.	P																																																																												
	Table ZD.1 - Permissible I^2t (let-through) values for RCBOs type B with rated current up to and including 63A <table><tr><th colspan="6">Type B</th></tr><tr><th rowspan="2">Rated short-circuit capacity (A) I_{CN}</th><th>class 1</th><th colspan="4">class 3</th></tr><tr><th>$\leq 63A$</th><th>$\leq 16A$</th><th>20A, 25A, 32A</th><th>40A</th><th>50A, 63A</th></tr><tr><td>3 000</td><td rowspan="4">No limits specified</td><td>15 000</td><td>18 000</td><td>21 600</td><td>28 000</td></tr><tr><td>4 500</td><td>25 000</td><td>32 000</td><td>38 400</td><td>48 000</td></tr><tr><td>6 000</td><td>35 000</td><td>45 000</td><td>54 000</td><td>65 000</td></tr><tr><td>10 000</td><td>70 000</td><td>90 000</td><td>108 000</td><td>135 000</td></tr></table> Table ZD.2 - Permissible I^2t (let-through) values for RCBOs type C with rated current up to and including 63A <table><tr><th colspan="6">Type C</th></tr><tr><th rowspan="2">Rated short-circuit capacity (A) I_{CN}</th><th>class 1</th><th colspan="4">class 3</th></tr><tr><th>$\leq 63A$</th><th>$\leq 16A$</th><th>20A, 25A, 32A</th><th>40A</th><th>50A, 63A</th></tr><tr><td>3 000</td><td rowspan="4">No limits specified</td><td>17 000</td><td>20 000</td><td>24 000</td><td>30 000</td></tr><tr><td>4 500</td><td>28 000</td><td>37 000</td><td>45 000</td><td>55 000</td></tr><tr><td>6 000</td><td>40 000</td><td>52 000</td><td>63 000</td><td>75 000</td></tr><tr><td>10 000</td><td>80 000</td><td>100 000</td><td>120 000</td><td>145 000</td></tr></table>	Type B						Rated short-circuit capacity (A) I_{CN}	class 1	class 3				$\leq 63A$	$\leq 16A$	20A, 25A, 32A	40A	50A, 63A	3 000	No limits specified	15 000	18 000	21 600	28 000	4 500	25 000	32 000	38 400	48 000	6 000	35 000	45 000	54 000	65 000	10 000	70 000	90 000	108 000	135 000	Type C						Rated short-circuit capacity (A) I_{CN}	class 1	class 3				$\leq 63A$	$\leq 16A$	20A, 25A, 32A	40A	50A, 63A	3 000	No limits specified	17 000	20 000	24 000	30 000	4 500	28 000	37 000	45 000	55 000	6 000	40 000	52 000	63 000	75 000	10 000	80 000	100 000	120 000	145 000	P
Type B																																																																														
Rated short-circuit capacity (A) I_{CN}	class 1	class 3																																																																												
	$\leq 63A$	$\leq 16A$	20A, 25A, 32A	40A	50A, 63A																																																																									
3 000	No limits specified	15 000	18 000	21 600	28 000																																																																									
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Type C																																																																														
Rated short-circuit capacity (A) I_{CN}	class 1	class 3																																																																												
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3 000	No limits specified	17 000	20 000	24 000	30 000																																																																									
4 500		28 000	37 000	45 000	55 000																																																																									
6 000		40 000	52 000	63 000	75 000																																																																									
10 000		80 000	100 000	120 000	145 000																																																																									
	The maximum I^2t values measured during the test of I_{CN} (test sequence F_0 or F_1 as applicable), in accordance with 9.12.11.4 serve as reference values for the classification. Compliance with the requirements of tables ZD.1 and ZD.2 is checked on the RCBOs with the highest rated current available within the range covered by each of these tables. If these current ratings are not included in the samples submitted to test sequences F_0 or F_1 of annex A, the appropriate number of samples of these ratings shall be additionally submitted to that test sequence. None of the values measured shall exceed the permissible I^2t value of the proposed energy limiting class in accordance with tables ZD.1 and ZD.2. If RCBOs rated 40 A are submitted with the range of RCBOs with rating exceeding 16 A and their measured I^2t values are lower than those indicated in tables ZD.1 or ZD.2 for rating 32 A, no relevant test is necessary for the RCBOs rated 32 A. If RCBOs rated 50 A or 63 A are submitted with the range of RCBOs with rating exceeding 32 A and their measured I^2t values are lower than those indicated in tables ZD.1 or ZD.2 for rating 40 A, no relevant test is necessary for the RCBOs rated 40 A	P																																																																												

IEC61009_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE Z3 – REQUIREMENTS FOR MARKING

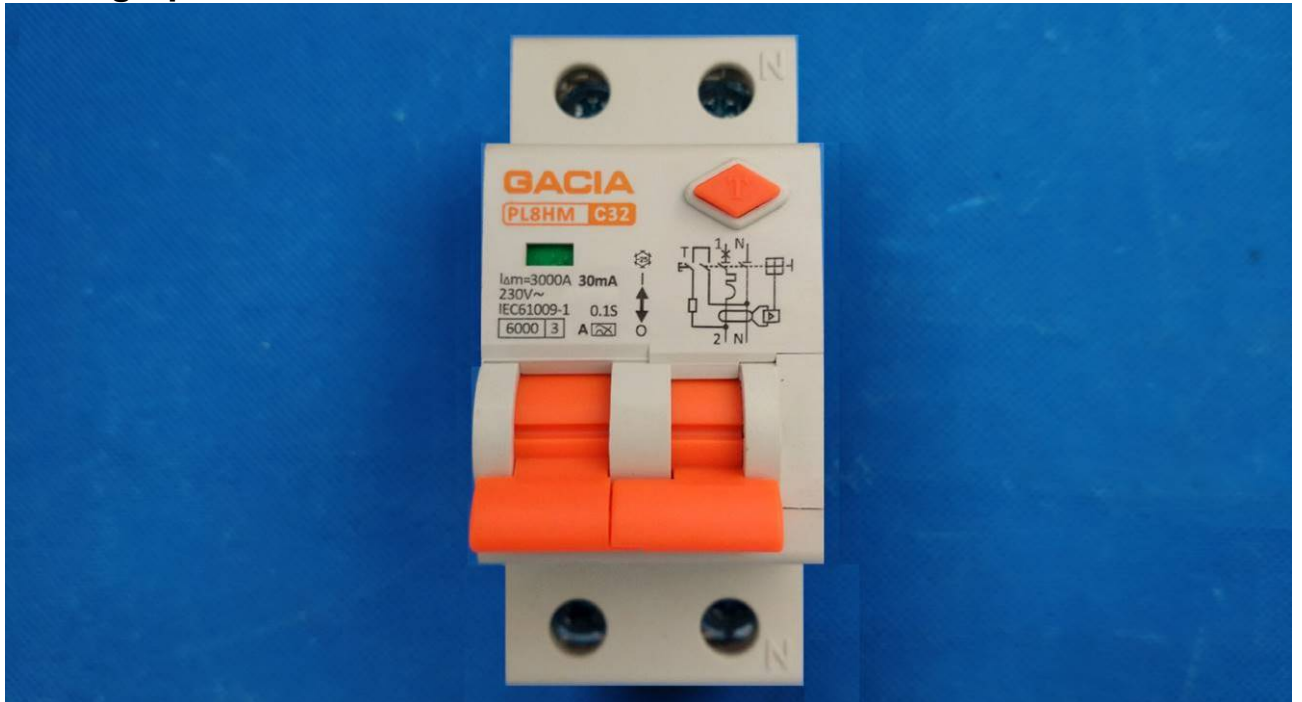
		Marking on the RCBO itself			Product information in the catalogue
		If, for small devices the space available does not allow all the data to be marked, at least the following information shall be marked and visible when the device is installed.	The following information may be marked on the side or on the back of the device and be visible only before the device is installed.	Alternatively the following information may be on the inside of any cover which has to be removed in order to connect the supply wires.	Any remaining information not marked shall be given in the manufacturer's catalogues .
	Each RCBO shall be marked in a durable manner with all or, for small apparatus, part of the following data: The minimum requirements are indicated by the symbol "X"				
a)	The manufacturer's name or trademark		X		
b)	Type designation, catalogue number or serial number		X		
c)	Rated voltage(s) with the symbol ~		X		
d)	Rated current without symbol "A", preceded by the symbol of overcurrent instantaneous tripping (B, C or D), for example B16	X			
e)	Rated frequency, if the RCBO is designed for frequencies other than 50Hz (see 5.3.5)		X		
f)	Rated residual operating current ($I_{\Delta n}$) in A or in mA	X			
h)	Rated short circuit capacity, in amperes in a rectangle without symbol "A"		X *)		
j)	Reference calibration temperature, if different from 30°C				X
k)	The degree of protection (only if different from IP20)				X
l)	The position of use (symbol according to IEC 60051), if necessary		X		
m)	Rated residual making and breaking capacity ($I_{\Delta m}$), if different from rated short-circuit capacity (I_{cn})				X
n)	The symbol S (S in a square) for type S devices	X			
o)	symbol of the method of operation according to Table Z1 of 4.1 if the RCBO is functionally dependent on the line voltage		X	X	
q)	Operating means of the test device, by the letter T (**)	X			
r)	Wiring diagram unless the correct mode of operation is evident		X	X	
s)	Operating characteristic in presence of residual currents with d.c. components - RCBOs of type AC with the symbol  - RCBOs of type A with the symbol 	X	X		
t)	Energy limiting class (e.g. 3) in a square in accordance with Annex ZD if applied (***)		X *)		
u)	RCBOs according to 4 Z1 marked with the symbol (snowflake enclosing -25)		X		
v)	Indication of the terminal for the neutral with "N"		X		
w)	Additional marking of performance to other standards or additional requirements according to 6.Z2		X		

*) I_{cn} and the energy limiting class, if applied, shall be on the device and combined together

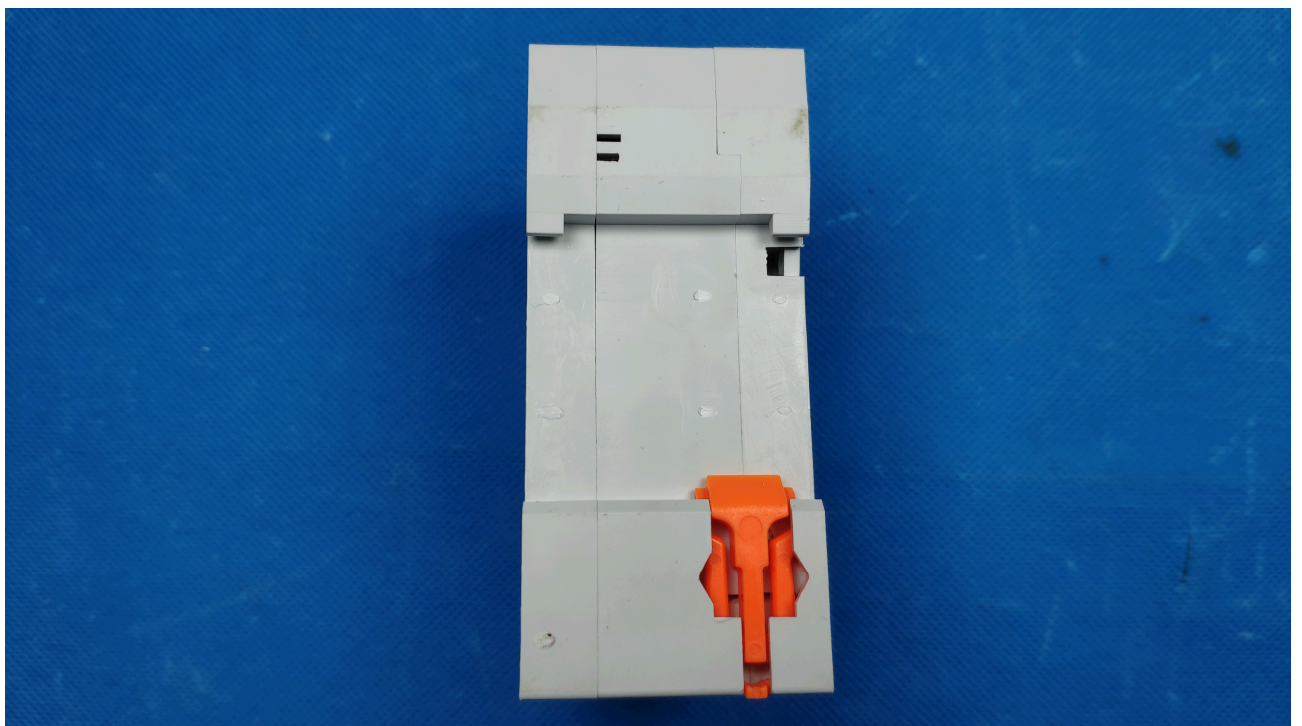
**) It is recommended to advise the user to test the device regularly

***) If annex ZD is not applicable to the device, I^2t characteristics shall be available on request

Photographs



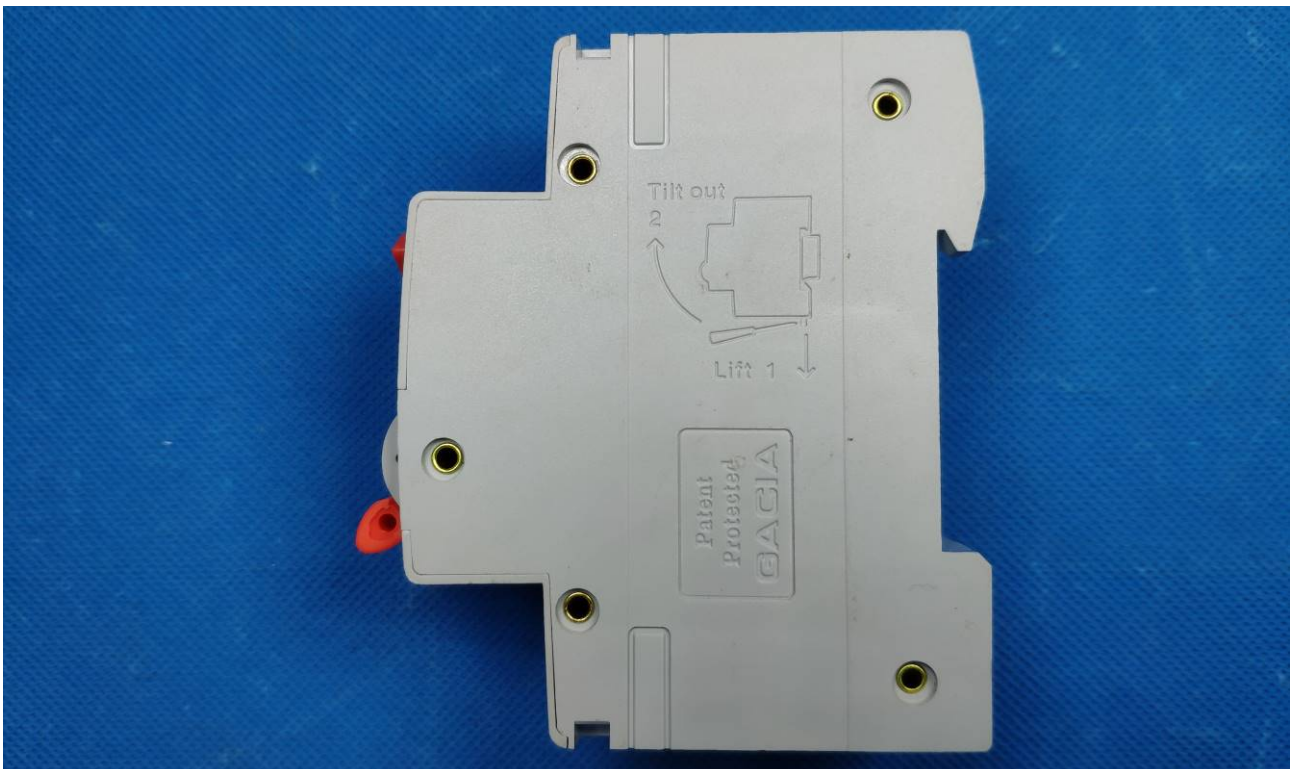
Front view, 1P+N / C32 / 30 mA / A type



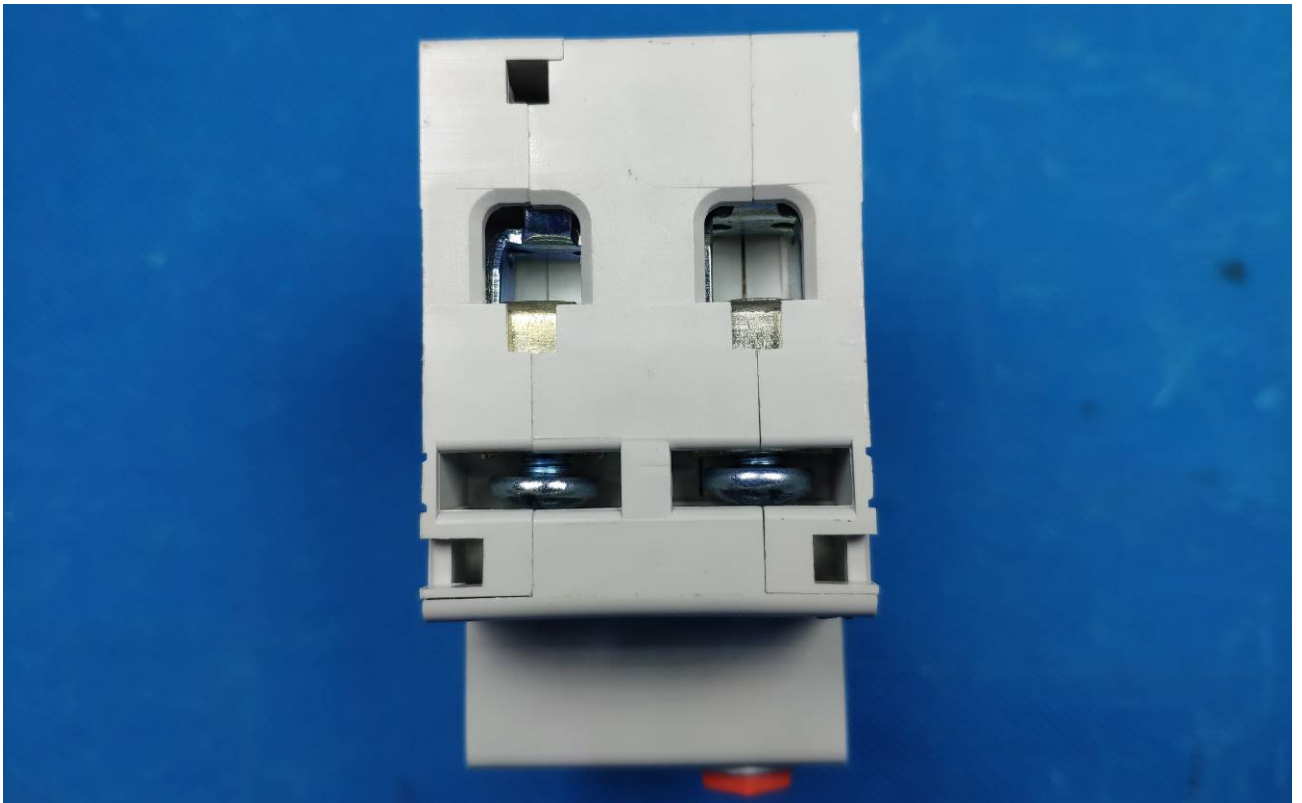
Back view, 1P+N / C32 / 30 mA / A type



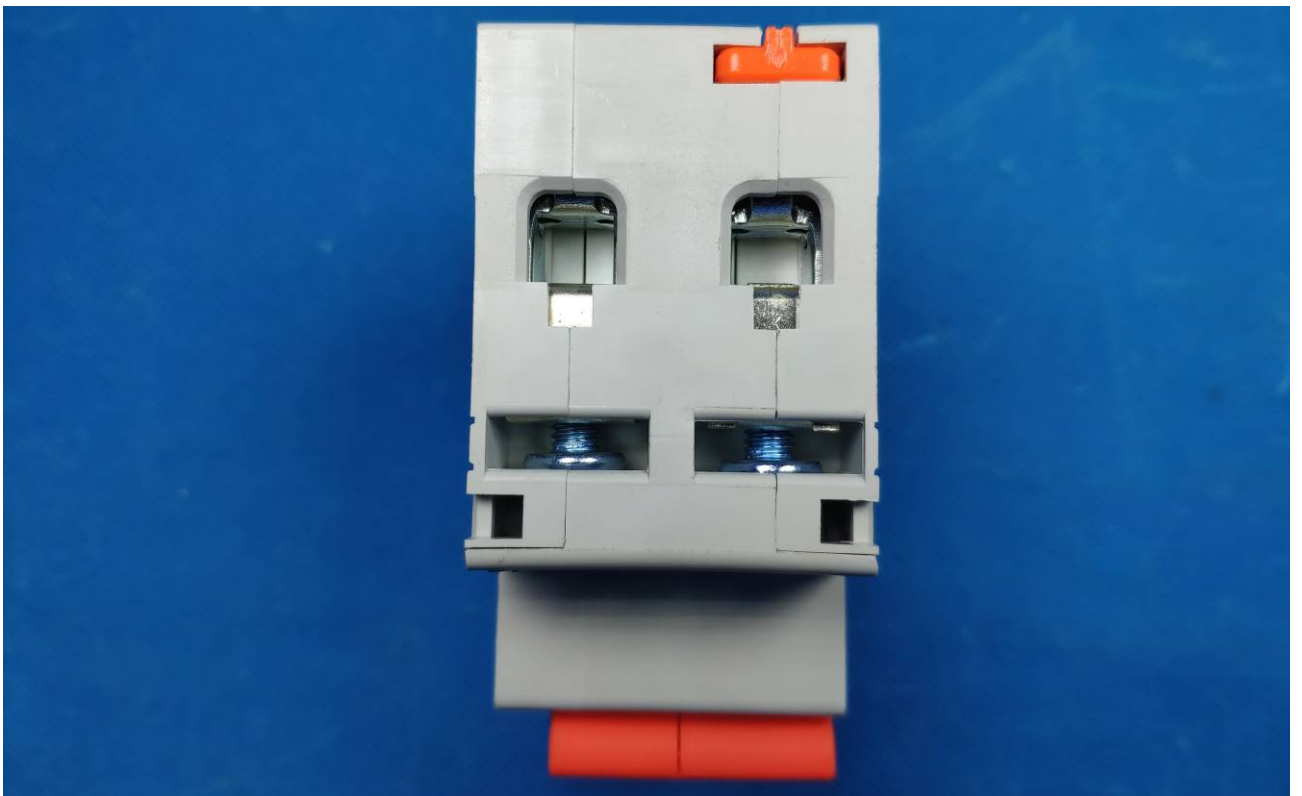
Side view, 1P+N / C32 / 30 mA / A type



Side view, 1P+N / C32 / 30 mA / A type



Top view, 1P+N / C32 / 30 mA / A type



Bottom view, 1P+N / C32 / 30 mA / A type