REVALCO ELECTRIC SPAIN, S.L.

CE Technical Documents

Product Name: Miniature Circuit Breaker

Applied Directive : Electromagnetic Compatibility Directive 2014/30/EU

Document No.: XMT0202200691S/EMC

Date: 2022.12.22

Revision: V0

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The product that is produced by **REVALCO ELECTRIC SPAIN, S.L.**

Test model: **RV30 Basic model Series and RV30 Normal Model Series** or the “EUT" as referred to in this report is a **Miniature Circuit Breaker.**

Application model:

RV30 Basic model Series and RV30 Normal Model Series
Ue=240/415V~(1P),240V~(1P+N),415V~(2P,3P,3P+N,4P)
In=1, 2, 3, 4, 6, 10, 16, 20, 25, 32, 40, 50, 63A B-, C- and D- Type
IEC 60898-1:Ics=Icn=6000A,Energy limiting class 3(Only for B,C type)
IEC 60947-2:Icn=10000A, Ics=7500A,Energy limiting class 3(Only for B,C type)

Difference of the series model:

The appearance is different, but the function is the same.

Objective

In order to meet the EMC requirements approved by CENELEC, the following standards will be cited:

1. EN IEC 61000-6-1:2019, Electromagnetic compatibility (EMC). Generic standards. Immunity standard for residential, commercial and light-industrial environments

2. EN IEC 61000-6-3:2021, Electromagnetic compatibility (EMC). Generic standards. Emission standard for residential, commercial and light-industrial environments

3. EN IEC 61000-3-2:2019+A1:2021, Electromagnetic compatibility (EMC). Limits. Limits for harmonic current emissions (equipment input current ≤16 A per phase)

4. EN 61000-3-3:2013+A2:2021, Electromagnetic compatibility (EMC) - Limits. Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

Equipment Modifications

No modification to the EUT was made by XMTEST to make sure the EUT comply with applicable limits.

Note: The test data is only valid for the test sample. There is possible deviation from the original test data for other products

EN IEC 61000-6-3

3.1 Continuous Disturbance Voltage at Mains Terminal.

3.1.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
No.2 Radio factory of Changzhou	Screened Room	P-22	No	12/6/21	12/5/23
AFJ	EMI Receiver	ER55 CR/2.8	55790015165	12/6/21	12/5/23
AFJ	16A LINE Impedance Stabilization	LS16C	16010020077	12/6/21	12/5/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

3.1.2 Description of Measurement Conditions

Temperature: 21℃
Humidity: 58%
Pressure: 1033mbar
Electromagnetic environment: normal

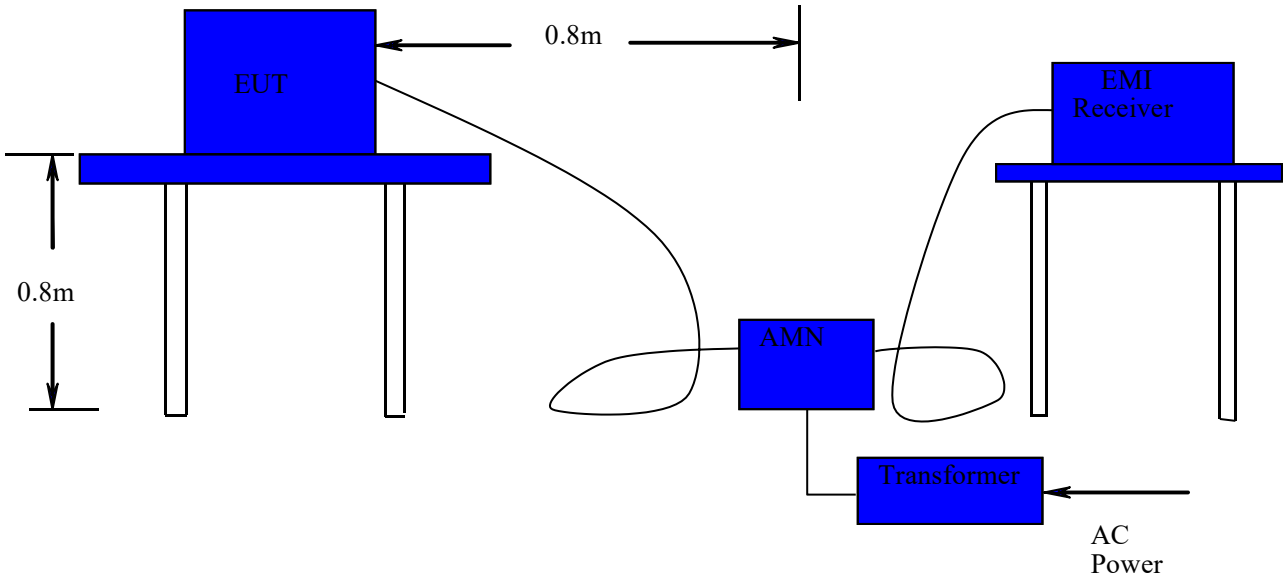
3.1.3 Limits of Continuous Disturbance Voltage at Mains Terminal.

Equipment type	Frequency range MHz	Limit values dBμV	
		Quasi-peak	Average
Household appliance	0.15 to 0.5	66-56 [a]	56- 46 [a]
	0.5 to 5	56	46
	5 to 30	60	50
[a] Decreasing linearly with logarithm of the frequency.			

Note: If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

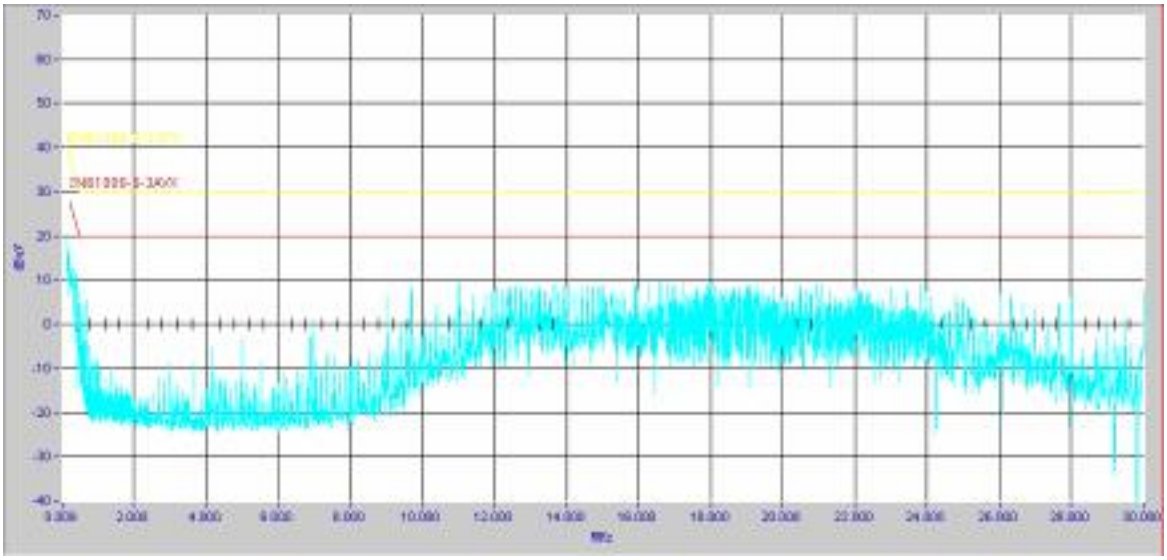
3.1.4 Configuration

The configuration is in accordance with the requirement in EN IEC 61000-6-3, the sketch map as follow:



3.1.5 Test Data and Records

Disturbance Voltage at the Mains Terminal TEST DATA			**EN IEC**
Frequency	Amplitude	Detector	Limit
MHz	dBμV	QP/Ave/Peak	dBμV
0.15-0.5	*	QP	66-56 Decreasing linearly with logarithm of the frequency
0.50-5	*	QP	56
5-30	*	QP	60
* Means the continuous disturbance voltage level 10dB lower than limits.			



3.1.6 Verdict

The EUT met the requirement.

3.2 Radiated disturbances

3.2.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
SCHAFFNER	Receive Antenna	CBL6112B	/	12/6/21	12/5/23
AFJ	EMI Receiver	ER55 CR/2.8	55790015165	6/23/21	6/22/23
Albatross Project	3Meter Anechoic Chamber		9290832	12/13/21	12/12/23
AFJ	16A LINE Impedance Stabilization Network	LS16C	16010020077	6/23/21	6/22/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

3.2.2 Description of Measurement Conditions

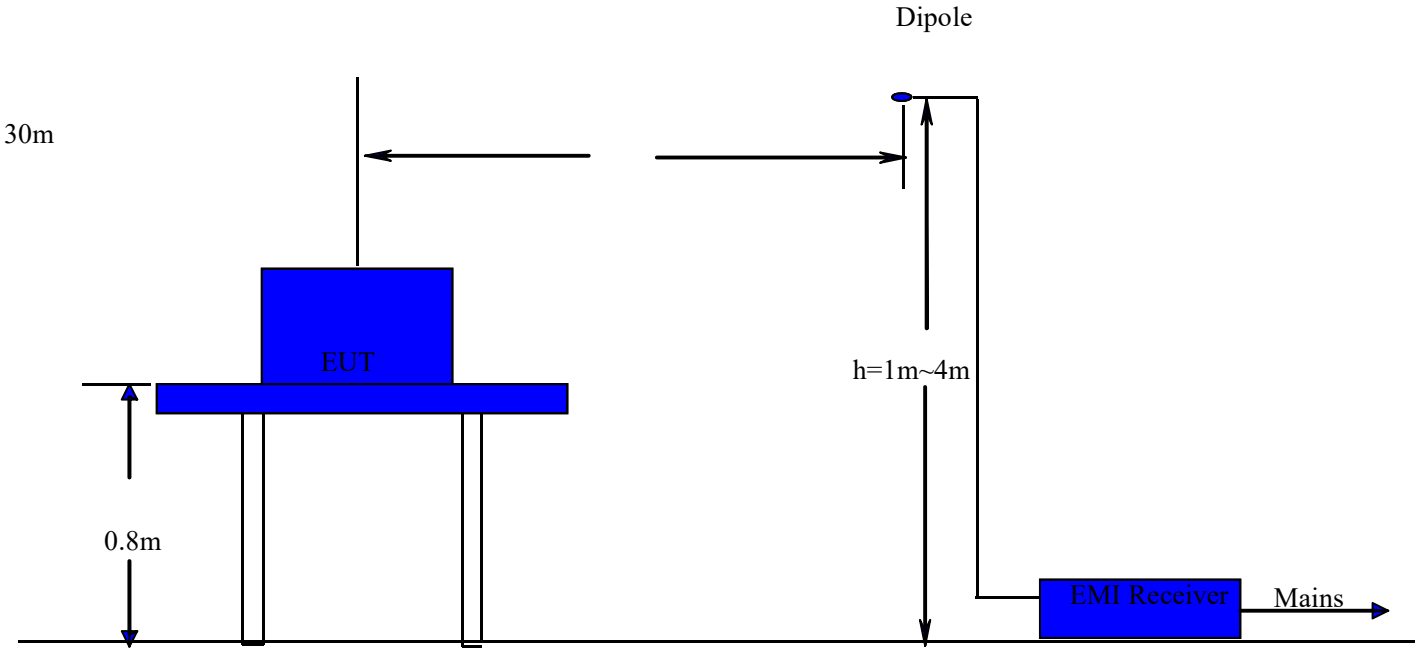
Temperature：20℃
Humidity: 60%
Pressure: 1033mbar
Electromagnetic environment: normal

3.2.3 Limits of radiated disturbances of class B ITE at a measuring distance of 10m.

Frequency range MHz	Quasi-peak limits(10m) dB(μV/m)
30 to 230	30
230 to 1000	37
NOTE: The lower limit shall apply at the transition frequency. NOTE: Additional provisions may be required for cases where interference occurs.	

3.2.4 Configuration

The configuration is in accordance with the requirement in EN IEC 61000-6-3, the sketch map as follow:

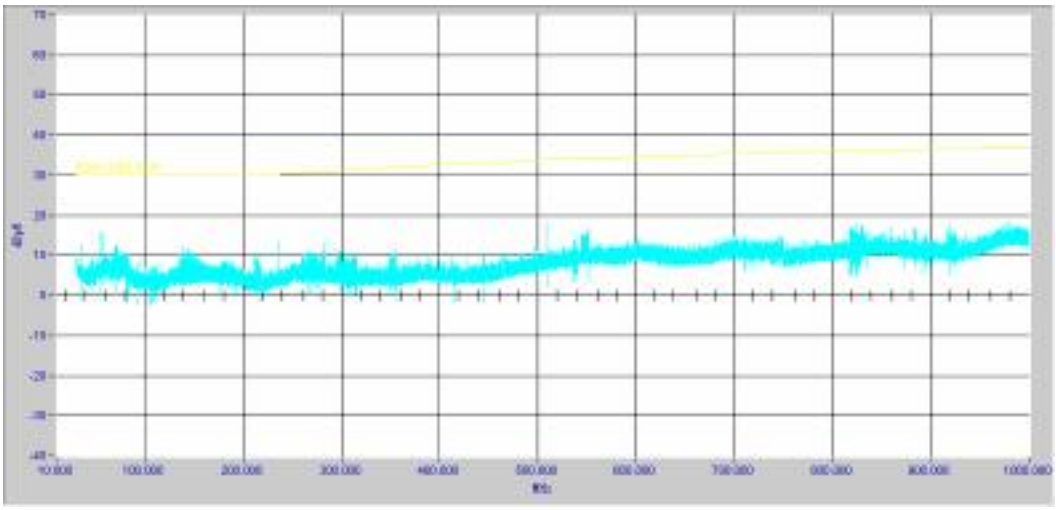


3.2.5 Test Data and Records

Radiated disturbances TEST DATA			EN IEC	
Frequency	**Amplitude**	**Detector**	**Limit(10m)**	**Margin**
MHz	dB(μV/m)	**Qp/Ave/Peak**	**dB(μV/m)**	**dB**
30 to 230	*	**QP**	30	
230 to 1000	*	**QP**	37	

NOTE: * Means the radiated disturbance level 10dB lower than limits

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3.2.6 Verdict

The EUT met the requirement.

3.3 Discontinuous Disturbance Voltage at Mains Terminal (Click)

3.3.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
No.2 Radio factory of Changzhou	Screened Room	P-22	No	12/6/21	12/5/23
AFJ	CLICK Analyzer	CL-55C	55040019044	3/7/21	3/7/23
AFJ	16A LINE Impedance Stabilization Network	LS16C	16010020077	6/23/21	6/22/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

3.3.2 Description of Measurement Conditions

Temperature: 22℃
Humidity: 56%
Pressure: 1033mbar
Electromagnetic environment: normal

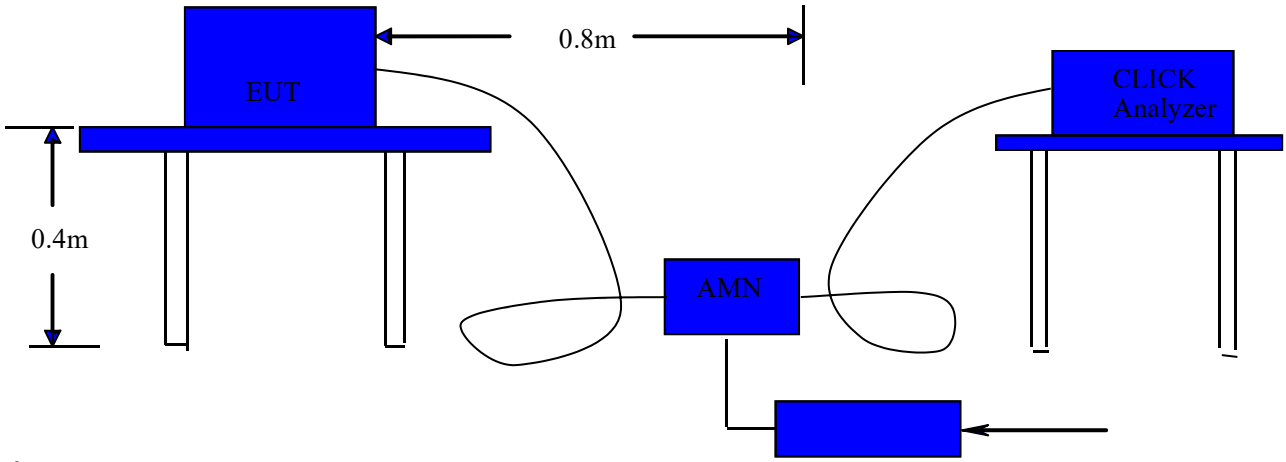
3.3.3 Limits of Click

For discontinuous disturbance, the click limit is attained by increasing the relevant limit of Continuous Disturbance Voltage with:

44dB for $N < 0.2$ or
20lg(30/N) dB for $0.2 \leq N < 30$

3.3.4 Configuration

The configuration in accordance with the requirement in EN IEC 61000-6-3, the sketch map as follow:



Transformer

3.3.5 Verdict

The EUT met the requirement.

EN IEC 61000-6-1

Description of Performance Criterion (According with EN IEC 61000-6-1 Section 4)

Performance Criterion A

The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacture, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance Criterion B

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however, no change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacture, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance Criterion C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

4.1 SURGES

4.1.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
Japan	Surge Lite	LSS-6030	9099E00350	10/14/21	10/13/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

4.1.2 Description of Measurement Conditions

Temperature: 21℃

Humidity: 58%

Pressure: 1033mbar

Electromagnetic environment: normal

4.1.3 Configuration

The configuration is in accordance with the requirement in EN61000-4-5.

4.1.4 Test Data and Records

Level	Voltage	Poll	Path	Pass	Fail
1	**1kV**	±	L-N	**B**	
2	**2kV**	±	L-PE, N-PE	**B**	
3					
4					

4.1.5 Verdict

The EUT was working as normal, so they met the requirement of performance criteria B.

4.2 ESD

4.2.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
Shanghai Sanki	Electrostatic Discharge tester	ESD-320	0329501C	6/23/21	6/22/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

4.2.2 Description of Measurement Conditions

Temperature: 21℃

Humidity: 58%

Pressure: 1033mbar

Electromagnetic environment: normal

4.2.3 Configuration

The configuration is in accordance with the requirement in EN61000-4-2.

4.2.4 Test Data and Records

Air Discharge

Test Levels																
EN61000-4-2 Test Points	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-10 kV	+10 kV	-12.5 kV	+12.5 kV	-15 kV	+15 kV	-20 kV	+20 kV
EUT Front Side	B	B	B	B	B	B	B	B								
EUT Top Side	B	B	B	B	B	B	B	B								
EUT Back Side	B	B	B	B	B	B	B	B								
EUT Left Side	B	B	B	B	B	B	B	B								
EUT Right Side	B	B	B	B	B	B	B	B								

Direct Contact

Test Levels																
EN61000-4-2 Test Points	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-10 kV	+10 kV	-12.5 kV	+12.5 kV	-15 kV	+15 kV	-20 kV	+20 kV
EUT Front Side	B	B	B	B												
EUT Top Side	B	B	B	B												
EUT Back Side	B	B	B	B												
EUT Left Side	B	B	B	B												
EUT Right Side	B	B	B	B												

4.2.5 Verdict

The EUT was working as normal, so they met the requirement of performance criteria B.

4.3 EFT/B

4.3.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
Shanghai Sanki	E.F.TB Generator	8014	069504E	6/23/21	6/22/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

4.3.2 Description of Measurement Conditions

Temperature: 21℃

Humidity: 58%

Pressure: 1033mbar

Electromagnetic environment: normal

4.3.3 Configuration

The configuration is in accordance with the requirement in EN61000-4-4.

4.3.4 Test Data and Records

Test Levels (kV)									
EN61000-4-4 Test Points		+0.25	-0.25	+0.5	-0.5	+1.0	-1.0	+2.0	-2.0
Power Port	L1	B	B	B	B				
	L2	B	B	B	B				
	L1+L2	B	B	B	B				
I/O Port		B	B	B	B				

4.3.5 Verdict

The EUT was working as normal, so they met the requirement of performance criteria B.

4.4 INJECTED CURRENTS

4.4.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
FLUKE	Synthesized RF Signal Generator	6061A	5080312	3/23/21	3/22/23
QF	Broadband Power Amplifier	QF3860	No	4/15/21	4/14/23
QF	Millivoltmeter	QF2281	92028	4/15/21	4/14/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

4.4.2 Description of Measurement Conditions

Temperature: 21℃

Humidity: 58%

Pressure: 1033mbar

Electromagnetic environment: normal

4.4.3 Configuration

The configuration in accordance with the requirement in EN 61000-4-6.

4.4.4 Test Data and Records

EN61000-4-6 Test Points	Frequency range MHz	Levels	Voltage Level (e.m.f.)V	Pass	Fail
Power Line	0.15-230MHz	1	1		
		2	3	A	
		3	10		
		X	Special		
I/O Line	0.15-230MHz	1	1		
		2	3	A	
		3	10		
		X	Special		

4.4.5 Verdict

The EUT was working as normal, so they met the requirement of performance criteria A.

4.5VOLTAGE DIPS AND INTERRUPTIONS

4.5.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
Japan	Voltage Dip Simulator	VDS-220B	2199D00098	10/22/21	10/21/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

4.5.2 Description of Measurement Conditions

Temperature: 21℃

Humidity: 58%

Pressure: 1033mbar

Electromagnetic environment: normal

4.5.3 Configuration

The configuration in accordance with the requirement in EN 61000-4-11.

4.5.4 Test Data and Records

Environmental phenomena		Test level in % U_T	Duration (in periods of the rated frequency)	Phase Angle	Pass	Fail
Interruptions		0	0.5T	0/180	**B**	
Voltage dips in % U_T	60	40	10T	0/180	**B**	
	30	70	50T	0/180	**B**	

4.5.5 Verdict

The EUT was working as normal, so they met the requirement of performance criteria B.

EN IEC 61000-3-2

1.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
EMC-PARTNER	Harmonics and Flicker Analyzer	HARMONIC S-1000	HAR1000-40	10/09/21	10/08/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

1.2 Description of Measurement Conditions

Temperature: 21℃
Humidity: 60%
Pressure: 1033mbar
Electromagnetic environment: normal

1.3 Configuration

The configuration is in accordance with the requirement in EN IEC 61000-3-2.

1.4 Test Data and Records

Order	Freq[Hz]	Iavg[A]	Iavg%L[%]	Imax[A]	Imax%L[%]	Limit[A]	Status
1	50	0.3129		0.4966			
2	100	0.0133	0.1241	0.0171	1.4563	1.0800	
3	150	0.0245	2.2358	0.0826	3.6303	2.3000	
4	200	0.0000	0.0051	0.0059	1.3626	0.4300	
5	250	0.0021	0.2193	0.0233	2.0399	1.1400	
6	300	0.0000	0.0000	0.0031	1.0376	0.3000	
7	350	0.0003	0.0549	0.0154	1.9975	0.7700	
8	400	0.0000	0.0000	0.0013	0.5838	0.2300	
9	450	0.0002	0.0499	0.0102	2.5482	0.4000	
10	500	0.0000	0.0000	0.0004	0.1990	0.1840	
11	550	0.0000	0.0091	0.0054	1.6276	0.3300	
12	600	0.0000	0.0000	0.0003	0.1990	0.1533	
13	650	0.0000	0.0000	0.0026	1.2498	0.2100	
14	700	0.0000	0.0000	0.0002	0.1858	0.1314	
15	750	0.0000	0.0000	0.0030	1.9938	0.1500	
16	800	0.0000	0.0000	0.0002	0.1592	0.1150	
17	850	0.0000	0.0000	0.0022	1.6602	0.1324	
18	900	0.0000	0.0000	0.0003	0.2985	0.1021	
19	950	0.0000	0.0000	0.0017	1.4431	0.1184	
20	1000	0.0000	0.0000	0.0002	0.2654	0.0920	
21	1050	0.0000	0.0000	0.0014	1.3102	0.1071	
22	1100	0.0000	0.0000	0.0001	0.1460	0.0836	
23	1150	0.0000	0.0000	0.0012	1.2478	0.0978	
24	1200	0.0000	0.0000	0.0001	0.0796	0.0767	
25	1250	0.0000	0.0000	0.0011	1.2207	0.0900	
26	1300	0.0000	0.0000	0.0001	0.0862	0.0708	
27	1350	0.0000	0.0000	0.0008	0.9521	0.0833	
28	1400	0.0000	0.0000	0.0001	0.1858	0.0657	
29	1450	0.0000	0.0000	0.0007	0.8653	0.0776	
30	1500	0.0000	0.0000	0.0001	0.0995	0.0613	
31	1550	0.0000	0.0000	0.0007	1.0091	0.0726	
32	1600	0.0000	0.0000	0.0001	0.2123	0.0575	
33	1650	0.0000	0.0000	0.0005	0.8057	0.0682	
34	1700	0.0000	0.0000	0.0001	0.2256	0.0541	
35	1750	0.0000	0.0000	0.0004	0.6646	0.0643	
36	1800	0.0000	0.0000	0.0001	0.1194	0.0511	
37	1850	0.0000	0.0000	0.0005	0.9033	0.0608	
38	1900	0.0000	0.0000	0.0001	0.1261	0.0484	
39	1950	0.0000	0.0000	0.0004	0.7406	0.0577	
40	2000	0.0000	0.0000	0.0001	0.1328	0.0460	
Result: Pass							

1.5 Verdict

The EUT met the requirement.

EN 61000-3-3

2.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
EMC-PARTNER	Harmonics and Flicker Analyzer	HARMONIC S-1000	HAR1000-40	10/09/21	10/08/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

2.2 Description of Measurement Conditions

Temperature: 21℃
Humidity: 60%
Pressure: 1033mbar
Electromagnetic environment: normal

2.3 Configuration

The configuration is in accordance with the requirement in EN 61000-3-3.

2.4 Test Data and Records

Plt = 0.140				
	Pst	dmax	dc	dt>Lim
1	0.085	0.350	0.310	0.000
2	0.075	0.000	0.100	0.000
3	0.079	0.000	0.100	0.000
4	0.223	1.090	1.110	0.000
5	0.092	0.400	0.320	0.000
6	0.074	0.000	0.110	0.000
7	0.077	0.000	0.080	0.000
8	0.156	1.090	1.140	0.000
9	0.083	0.340	0.310	0.000
10	0.072	0.000	0.110	0.000
11	0.072	0.000	0.090	0.000
12	0.237	1.091	1.080	0.000
Result: Pass				

2.5 Verdict

The EUT met the requirement.

APPENDIX A— TEST PHOTOGRAPH






Revalco
RV30 BC316
C16
IEC60898
I ON
O OFF


Revalco
RV30 NC416
C16
IEC60898
I ON
O OFF

EC Declaration of conformity

Council Directive 2014/30/EU on Electromagnetic Compatibility

REVALCO ELECTRIC SPAIN, S.L.

Certify that the product described is in conformity with the Directive 2014/30/EU as amended

Product Name:
Miniature Circuit Breaker

Item No:
RV30 Basic model Series and RV30 Normal Model Series
Ue=240/415V~(1P),240V~(1P+N),415V~(2P,3P,3P+N,4P)
In=1, 2, 3, 4, 6, 10, 16, 20, 25, 32, 40, 50, 63A B-, C- and D- Type
IEC 60898-1:Ics=Icn=6000A,Energy limiting class 3(Only for B,C type)
IEC 60947-2:Icn=10000A, Ics=7500A,Energy limiting class 3(Only for B,C type)

The product has been assessed by the application of the following standards:

EN IEC 61000-6-1:2019, EN IEC 61000-6-3:2021,
EN IEC 61000-3-2:2019+A1:2021, EN 61000-3-3:2013+A2:2021

Issue place and date

Company stamp and Signature of authorized personnel

REVALCO ELECTRIC SPAIN, S.L.

CE Technical Documents

Product Name: Miniature Circuit Breaker

Applied Directive : Low Voltage Directive 2014/35/EU

Document No.: XMT0202200690S/LVD

Date: 2022.12.22

Revision: V0

Applicant	REVALCO ELECTRIC SPAIN, S.L.
Address	REVALCO ELECTRIC SPAIN, S.L.

Test Item Description	
Product Name :	Miniature Circuit Breaker
Standard :	IEC 60898-1:2019+C1:2020, IEC 60947-2:2019
Model/Type Reference :	RV30 Basic model Series and RV30 Normal Model Series Ue=240/415V~(1P),240V~(1P+N),415V~(2P,3P,3P+N,4P) In=1, 2, 3, 4, 6, 10, 16, 20, 25, 32, 40, 50, 63A B-, C- and D- Type IEC 60898-1:Ics=Icn=6000A,Energy limiting class 3(Only for B,C type) IEC 60947-2:Icn=10000A, Ics=7500A,Energy limiting class 3(Only for B,C type)

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

General Remarks

- ♦ This report shall not be reproduced except in full without the written approval of the testing laboratory.
- ♦ The test results presented in this report relate only to the item tested.
- ♦ Clause numbers between brackets refer to clauses in IEC 60898-1:2019+C1:2020, IEC 60947-2:2019.
- ♦ “(see remark #)”refers to a remark appended to the report.
- ♦ “(see Annex #)”refers to an annex appended to the report.
- ♦ Throughout this report a point is used as the decimal separator.

Copy of Marking Plate

CE

Product Name :

Miniature Circuit Breaker

Model : RV30 Basic model Series and RV30 Normal Model Series

REVALCO ELECTRIC SPAIN, S.L.

IEC 60898-1:2019+C1:2020
ELECTRICAL ACCESSORIES - CIRCUIT-BREAKERS FOR OVERCURRENT PROTECTION FOR HOUSEHOLD AND SIMILAR INSTALLATIONS - PART 1: CIRCUIT-BREAKERS FOR A.C. OPERATION

1	**Scope and object**		-
	This clause of Part 1 is applicable except as follows:		-
	This standard gives additional requirements for single- and two-pole circuit-breakers which, in addition to the above characteristics, are suitable for operation with direct current, and have a rated d.c. voltage not exceeding 220 V for single-pole and 440 V for two-pole circuit-breakers,a rated current not exceeding 125 A and a rated d.c. short-circuit capacity not exceeding 10 000 A. NOTE：This standard applies to circuit-breakers able to make and break both a.c. current and d.c. current.		P
2	**Normative references**		-
	This clause of Part 1 applies. Delete IEC 61009-1:1991, IEC 61009-2-1:1991 and IEC 61009-2-2:1991.	Comply with the standard	P
3	**Definitions**		-
3.1	time constant the rise time T = L/R (ms) of a prospective direct current to reach a value of 0,63 times the maximum peak current.		P
4	**Classification**		-
	Clause 4 of Part 1 applies with the following modifications:		-
4.1	**According to the number of poles**		-
	Replacement: – single-pole circuit-breakers; – two-pole circuit-breakers with two protected poles.		P
4.2	**According to the instantaneous tripping current**		P
	Delete D-Type.		P
4.3	**According to the time constant**		-
	– Circuit-breakers suitable for d.c. circuits with a time constant of T ≤ 4 ms. – Circuit-breakers suitable for d.c. circuits with a time constant of T ≤ 15 ms. NOTE It is assumed that short-circuit currents of 1 500 A are not exceeded in installations in which, due to the loads connected, time constants in normal service up to 15 ms can occur. Where higher short-circuit currents may occur, the time constant of T = 4 ms is considered sufficient.		P
4.4	**Characteristics of circuit-breakers**		-

	Clause 5 applies with the following modification:		-
4.4.1	**Preferred values of rated voltage**		-
	Replacement: The preferred values of rated voltages are given in table 1. Examples of connections of circuit-breakers in d.c. systems are given in figure 18.		P
4.5	**Marking and other product information**		-
	Clause 6 of Part 1 applies with the following modifications:		-
	c) rated a.c. voltage with the symbol ~ and rated d.c. voltage with the symbol . d) replace (B, C or D) by (B or C). f) rated short-circuit capacity for a.c. and d.c. in amperes in one rectangle, without the symbol A, if valid for both a.c. and d.c. (see example 1 below). If the rated short-circuit capacity is different for a.c. and d.c. this shall be indicated in two adjacent rectangles,without the symbol A, with the symbol ~ near the rectangle containing the a.c. value and with the symbol near the rectangle containing the d.c. value (see example 2 below). Addition: l) time constant T15 within a rectangle, if applicable, associated with the marking for the short-circuit capacity at the time constant of 15 ms (see example 3 below). Replacement of the first paragraph following l):If, for small devices, the space available does not allow all the above data to be marked, at least the information under c) and d) shall be marked and visible when the circuit-breaker is installed.The information under a), b), e), f), g), h), i) and l) may be marked on the side or on the back of the device and be visible only before the device is installed. Alternatively, the information under g) 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 literature.	See example 2	P
	EXAMPLE 1 6 000 EXAMPLE 2 10 000 ~ 6 000 EXAMPLE 3 1 500 T15.The terminals shall be marked with + or – if necessary. Additionally, arrows indicating the direc- tion of the current are allowed.		P
5	**Standard conditions for operation in service**		-
	Clause 7 of Part 1 applies.	See Clause 7	P
6	**Requirements for construction and operation**		-
	Clause 8 of Part 1 applies with the following modifications:	See Clause 7	P
6.1	**Standard time-current zone**	See table 7	P

6.2	**Performance at short-circuit currents**		-
	It is required that circuit-breakers be able to make and to break any value of current up to and including the value corresponding to the rated short-circuit capacity at rated frequency, at a power-frequency recovery voltage equal to 105 % (±5 %) of the rated operational voltage and at any power factor not less or any time constant not greater than the appropriate limit of the range; it is also required that the corresponding values of I2 t lie below the I2 t characteristic.		P
7	**Tests**		-
	Clause 9 of Part 1 applies with the following modifications:	See the following modifications	P
7.1	**Type tests and test sequences**		-
	The test sequences and the number of samples to be submitted are stated in annex C of this standard.	See annex C	P
7.2	Replacement of the second paragraph after table 8:		-
	The test sequences and the number of samples to be submitted are stated in annex C of this standard.	See annex C	P
7.3	**Test of instantaneous tripping and of correct opening of the contacts**		P
7.3.1	**For circuit-breakers of the B-type**		-
	An alternating current equal to 3 In is passed through all poles, starting from cold. The opening time shall be not less than 0,1 s and not more than: – 45 s for rated currents up to and including 32 A; – 90 s for rated currents above 32 A. An alternating current equal to 5 In is then passed through all poles, starting from cold.The circuit-breaker shall trip in a time less than 0.1 s.A direct current equal to 4 In is passed through all poles, starting from cold.The opening time shall be not less than 0.1 s and not more than: – 45 s for rated currents up to and including 32 A; – 90 s for rated currents above 32 A. A direct current equal to 7 In is then passed through all poles, starting from cold.The circuit-breaker shall trip in a time less than 0.1s.		P
7.3,2	**For circuit-breakers of the C-type**		-
	An alternating current equal to 5 In is passed through all poles, starting from cold.The opening time shall be not less than 0.1 s and not more than: – 15 s for rated currents up to and including 32 A; – 30 s for rated currents above 32 A. An alternating current equal to 10 In is then passed through all poles, starting from cold.The circuit-breaker		P

	shall trip in a time less than 0.1 s.		
	A direct current equal to 7 In is passed through all poles, starting from cold.The opening time shall be not less than 0.1 s and not more than: – 15 s for rated currents up to and including 32 A; – 30 s for rated currents above 32 A. A direct current equal to 15 In is then passed through all poles, starting from cold.The circuit-breaker shall trip in a time less than 0.1 s.		P
7.4	**Test of mechanical and electrical endurance**		P
7.4.1	**General test conditions**		-
	Replacement of the fourth paragraph:The alternating current shall have a substantially sine-wave form and the power factor shall be between 0,85 and 0,9.The direct current shall have a ripple of ω ≤5 % and a time constant of T = 4 ms (with a tolerance e of 0−10 %) or, for circuit-breakers marked with T15, a time constant of T = 15 ms(with a tolerance of 0−10 %).		P
7.4.2	**Test procedure**		-
	Replacement of the first paragraph:One set of circuit-breakers is submitted to 4 000 operating cycles at alternating current, and another set to 1 000 operating cycles at direct current, both at their rated current.		P
7.4.3	**Tolerances and test quantities**		-
	Addition: – ripple ≤5 % – time constant 0−10 %.		P
7.4.4	**Power factor and time constant of the test circuits**		-
	Addition: For d.c. test currents up to and including 1 500 A, one of the following time constants shall be used: T = L / R = 4 ms for devices not marked T15 T = L / R = 15 ms for devices marked T15.		P
	For d.c. tests currents above 1 500 A and less than or equal to 10 000 A, the tests for all samples are made at the time constant of T = 4 ms. NOTE It is assumed that short-circuit currents of 1 500 A are not exceeded in installations in which, due to the loads connected, time constants in normal service up to 15 ms can occur. Where higher short-circuit currents may occur, the time constant of T = 4 ms is considered sufficient.		P
7.4.5	**Interpretation of records in case of d.c. voltage**		-
	a) Determination of the applied voltage and the recovery voltage.The applied voltage and the recovery voltage are determined from the record taken during the break		P

	test.The voltage on the supply side shall be measured after arc extinction and after high frequency phenomena have subsided. b) Determination of the prospective short-circuit current. NOTE The value of the prospective current is taken as being equal to the maximum value A2 as determined from the calibration curve because circuit-breakers according to this standard break the current before it has reached its maximum value.The maximum value of the prospective current is indicated as A2 in figure 7b.		
7.4.6	**Tests at reduced d.c. short-circuit currents**		-
	At direct currents the test circuit is adjusted so as to obtain a current of 500 A or 10 × In whichever is the higher, at a time constant corresponding to the assigned time constant.Each of the protected poles of the circuit-breaker is subjected separately to a test in a circuit,of which the connections are shown in figure 3.The circuit-breaker is caused to open automatically three times, the circuit being closed once by the auxiliary switch A and twice by the circuit-breaker itself.The sequence of operations shall be: O – t – CO – t – CO After arc extinction.	See Figure 3	P
7.4.7	**Test at small direct currents up to and including 150 A**		-
	The circuit-breaker shall be closed three times on to each of the test currents listed below;during the tests the operating means is actuated as in normal use. If the circuit-breaker does not trip, it shall be switched off manually.Test currents: 1 A, 2 A, 4 A, 8 A, 16 A, 32 A, 63 A, 150 A .The time between each operating cycle CO shall be at least 10 s, the closing time shall not be longer than 2 s. The time between the various test currents shall be at least 2 min.The time of the arc extinction during the test shall not exceed 1 s.		P
7.5	**Test at 1 500 A**		-
	For circuit-breakers having rated short-circuit capacity of 1 500 A, the test circuit is calibrated to obtain a current of 1 500 A at a power factor corresponding to this current according to table 17.For direct current the time constant is calibrated corresponding to the assigned time constant.		P
	For circuit-breakers having rated short-circuit capacity exceeding 1 500 A, the test circuit is calibrated at a power factor corresponding to 1 500 A,according to table 17.For direct current the time constant is calibrated corresponding to the assigned time constant.		P
	For single-pole circuit-breakers of rated voltage 230/400 V the operations for a.c. are as follows:Subsequent to the	See Figure 5	P

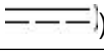
	six O operations only Two CO operations are performed. In addition,these circuit-breakers are then tested by performing simultaneously one O operation, with one circuit-breaker being inserted in each phase of the test circuit for three-pole circuit-breakers(see figure 5). For this test the auxiliary switch establishing the short-circuit is not synchronized.For the tests at d.c. – single-pole circuit-breakers of rated voltage 220 V are tested in a circuit according to figure 3; – two-pole circuit-breakers of rated voltage 440 V are tested in a circuit according to figure 4b.		
7.6	**Test at service short-circuit capacity**		-
	a) The test circuit is calibrated, on a.c. with a power factor according to table 17, or on d.c. with a time constant .Addition: e) In the case of direct current, the test sequence for single- and two-pole circuit-breakers is:O – t – CO – t – CO Three operations are made, the circuit being closed once by the auxiliary switch A and twice by the circuit-breaker.Single-pole circuit-breakers of rated voltage 220 V are tested in a circuit according to figure 3.Two-pole circuit-breakers of rated voltage 440 V are tested in a circuit according to figure 4b.		P
7.7	**Test at rated short-circuit capacity**		-
	a) The test circuit is calibrated , on a.c. with a power factor according to table 17, on d.c. with a time constant according to 9.12.5.Addition: c) In the case of direct current, the test sequence for single- and two-pole circuit-breakers is:O – t – CO Two operations are made, the circuit being closed once by the auxiliary switch A and once by the circuit-breaker.Single-pole circuit-breakers of rated voltage 220 V are tested in a circuit according to figure 3.Two-pole circuit-breakers of rated voltage 440 V are tested in a circuit according to figure 4b.		P
7.8	**Verification of the circuit-breaker after short-circuit tests**		P

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4	**Characteristics of circuit-breakers**		-
4.3	**Rated and limiting values of the main circuit**		-
	The rated values established for a circuit-breaker shall be stated in accordance with 4.3.1 to 4.4, but it is not necessary to establish all the rated values listed.		P
4.3.5	**Short-circuit characteristics**		-
4.3.5.1	**Rated short-circuit making capacity (*I*cm)**		-
	The rated short-circuit making capacity of a circuit-breaker is the value of short-circuit making capacity assigned to that circuit-breaker by the manufacturer for the rated operational voltage at rated frequency and at a specified power factor for a.c., or time constant for d.c. It is expressed as the maximum prospective peak current.		P
	For a.c. the rated short-circuit making capacity of a circuit-breaker shall be not less than its rated ultimate short-circuit breaking capacity, multiplied by the factor *n* of Table 2 (see 4.3.5.3).	9.5 KA r.m.s.	P
	For d.c., the rated short-circuit making capacity of a circuit-breaker shall be not less than its rated ultimate short-circuit breaking capacity.		N/A
	A rated short-circuit making capacity implies that the circuit-breaker shall be able to make the current corresponding to that rated capacity at the appropriate applied voltage related to the rated operational voltage.		P
4.3.5.2	**Rated short-circuit breaking capacities**		-
	The rated short-circuit breaking capacities of a circuit-breaker are the values of short-circuit breaking capacity assigned to that circuit-breaker by the manufacturer for the rated operational voltage, under specified conditions.		P
	A rated short-circuit breaking capacity requires that the circuit-breaker shall be able to break any value of short-circuit current up to and including the value corresponding to the rated capacity at a power-frequency recovery voltage corresponding to the prescribed test voltage		P

	values and:		
	– for a.c., at any power factor not less than that of Table 11 (see 8.3.2.2.4);	0.8	P
	– for d.c., with any time constant not greater than that of Table 11 (see 8.3.2.2.5).		N/A
	For power-frequency recovery voltages in excess of the prescribed test voltage values (see 8.3.2.2.6), no short-circuit breaking capacity is guaranteed.		P
	For a.c., the circuit-breaker shall be capable of breaking a prospective current corresponding to its rated short-circuit breaking capacity and the related power factor given in Table 11, irrespective of the value of the inherent d.c. component, on the assumption that the a.c. component is constant.		P
	The rated short-circuit breaking capacities are stated as:		P
	– rated ultimate short-circuit breaking capacity; – rated service short-circuit breaking capacity.		P
4.3.5.2.1	**Rated ultimate short-circuit breaking capacity (*I*cu)**		-
	The rated ultimate short-circuit breaking capacity of a circuit-breaker is the value of ultimate short-circuit breaking capacity (see 2.15.1) assigned to that circuit-breaker by the manufacturer for the corresponding rated operational voltage, under the conditions specified in 8.3.5. It is expressed as the value of the prospective breaking current, in kA (r.m.s. value of the a.c. component in the case of a.c.).	6 KA r.m.s.	P
4.3.5.2.2	**Rated service short-circuit breaking capacity (*I*cs)**		-
	The rated service short-circuit breaking capacity of a circuit-breaker is the value of service short-circuit breaking capacity (see 2.15.2) assigned to that circuit-breaker by the manufacturer for the corresponding rated operational voltage, under the conditions specified in 8.3.4. It is expressed as a value of prospective breaking current, in kA, or as a % of *I*cu (for example *I*cs = 25 % *I*cu).	*I*cs = 30 % *I*cu	P
	*I*cs shall be at least equal to 25 % of *I*cu.		P
4.3.5.3	**Standard relationship between short-circuit making and breaking capacities and related**		P

	power factor, for a.c. circuit-breakers		
	The standard relationship between short-circuit breaking capacity and short-circuit making capacity is given in Table 2.	*n*=1.58	P
	The rated short-circuit making and breaking capacities are only valid when the circuit-breaker is operated in accordance with the requirements of 7.2.1.1 and 7.2.1.2.		P
	For special requirements, the manufacturer may assign a value of rated short-circuit making capacity higher than that required by Table 2. Tests to verify these rated values shall be the subject of agreement between manufacturer and user.		P
4.3.5.4	**Rated short-time withstand current (*I*cw)**	-	
	The rated short-time withstand current of a circuit-breaker is the value of short-time withstand current assigned to that circuit-breaker by the manufacturer under the test conditions specified in 8.3.6.2.		P
	For a.c., the value of this current is the r.m.s. value of the a.c. component of the prospective short-circuit current, assumed constant during the short-time delay.		P
	The short-time delay associated with the rated short-time withstand current shall be at least 0,05 s, preferred values being as follows:		P
	0,05 – 0,1 – 0,25 – 0,5 – 1 s		P
	The rated short-time withstand current shall be not less than the appropriate values shown in Table 3.		P
4.4	**Selectivity categories**		-
	The selectivity category of a circuit-breaker shall be stated with reference to whether or not it is specifically intended for selectivity by means of an intentional time delay with respect to other circuit-breakers in series on the load side, under short-circuit conditions (see Figure A.3).		P
	Attention is drawn to the differences of the tests applying to the two selectivity categories (see Table 9 and 8.3.4, 8.3.5, 8.3.6 and 8.3.8).		P
	Selectivity categories are defined in Table 4.		P
5	**Product information**		-
5.1	**Nature of the information**		-
	Subclause 5.1 of IEC 60947-1 applies, as far as		P

	appropriate for a particular design.		
	In addition the manufacturer shall make available, upon request, information concerning typical power losses for the various frame sizes (see 2.1.1). See Annex G.		P
5.2	**Marking**		-
	Each circuit-breaker shall be marked in a durable manner.	Durable	P
	a) The following data shall be marked on the circuit-breaker itself or on a nameplate or nameplates attached to the circuit-breaker, and located in a place such that they are visible and legible when the circuit-breaker is installed;	Marked as required	P
	• rated current (*I*n);		P
	• suitability for isolation, if applicable, with the symbol ;		P
	• indication of the open and closed positions, with  and respectively, if symbols are used (see 7.1.6.1 of IEC 60947-1).		P
	b) The following data shall also be marked externally on the circuit-breaker, as specified in item a), except that they need not be visible when the circuit-breaker is installed;	Marked	P
	• manufacturer's name or trade mark;		P
	• type designation or serial number;		P
	• IEC 60947-2 if the manufacturer claims compliance with this standard;		P
	• selectivity category;		P
	• rated operational voltage(s) *U*e (see 4.3.1.1 and, where applicable, Annex H);		P
	• rated impulse withstand voltage (*U*imp);		P
	• value (or range) of the rated frequency (for example 50 Hz), and/or the indication "d.c." (or the symbol );		P
	• rated service short-circuit breaking capacity (*I*cs) at the corresponding rated voltage (*U*e);		P
	• rated ultimate short-circuit breaking capacity (*I*cu) at the corresponding rated voltage (*U*e);		P
	• rated short-time withstand current (*I*cw), and associated short-time delay, for selectivity category B;		P
	• line and load terminals, unless their connection is immaterial;		P
	• neutral pole terminals, if applicable, by the		P

	letter N;		
	• protective earth terminal, where applicable, by the symbol  (see 7.1.10.3 of IEC 60947-1);		P
	• reference temperature for non-compensated thermal releases, if different from 30 °C;		P
	• range of the current setting (*I*r) of adjustable overload release (see 4.7.3);		P
	• value or range of the rated instantaneous short-circuit current setting (*I*i), fixed or adjustable (see 4.7.3).		P
	c) The following data shall either be marked on the circuit-breaker as specified in item b), or shall be made available in the manufacturer's published information:		P
	• rated short-circuit making capacity (*I*cm), if higher than that specified in 4.3.5.1;		N/A
	• rated insulation voltage (*U*i), if higher than the maximum rated operational voltage;		N/A
	• pollution degree if other than 3;		N/A
	• conventional enclosed thermal current (*I*the) if different from the rated current;		N/A
	• IP Code, where applicable (see Annex C of IEC 60947-1);		N/A
	• minimum enclosure size and ventilation data (if any) to which marked ratings apply;		N/A
	• details of minimum distance between circuit-breaker and earthed metal parts for circuitbreakers intended for use without enclosures;		N/A
	• suitability for environment A or environment B, as applicable;		N/A
	• r.m.s. sensing, if applicable, according to F.4.1.1;		N/A
	• minimum cable cross-section, if different from Table 9 of IEC 60947-1, for ratings ≤ 20 A according to rated ultimate short-circuit breaking capacity *I*cu;		N/A
	• values of tightening torque for the circuit-breaker terminals.		N/A
	d) The following data concerning the opening and closing devices of the circuit-breaker shall be placed either on their own nameplates or on the nameplate of the circuit-breaker; alternatively, if space available is insufficient,	They are made available in the manufacturer's published information	P

	they shall be made available in the manufacturer's published information:		
	• rated control circuit voltage of the closing device (see 7.2.1.2 of IEC 60947-1) and rated frequency for a.c.;		P
	• rated control circuit voltage of the shunt release (see 7.2.1.4 of IEC 60947-1) and/or of the under-voltage release (or of the no-voltage release) (see 7.2.1.3 of IEC 60947-1), and rated frequency for a.c.;		P
	• rated current of indirect over-current releases;		P
	• number and type of auxiliary contacts and kind of current, rated frequency (if a.c.) and rated voltages of the auxiliary switches, if different from those of the main circuit.		P
	e) Terminal marking		P
	Subclause 7.1.8.4 of IEC 60947-1 applies (see also item b) above).		P
6	**Normal service, mounting and transport conditions**		-
	Clause 6 of IEC 60947-1 applies with the following addition:		P
	Pollution degree (see 6.1.3.2 of IEC 60947-1)		P
	Unless otherwise stated by the manufacturer, a circuit-breaker is intended for installation under environmental conditions of pollution degree 3.		N/A
7	**Constructional and performance requirements**		-
7.1	**Constructional requirements**		-
	Subclause 7.1 of IEC 60947-1 applies. Where, in Subclause 7.1.2.2 of IEC 60947-1, the test temperature is to be specified, the test temperature required by this standard is 960 °C.	960 °C	P
7.1.1	**Withdrawable circuit-breakers**		-
	In the disconnected position, the isolating contacts of the main circuit and, where applicable, auxiliary circuits of withdrawable circuit-breakers shall have isolating distances which comply with the requirements specified for the isolating function, taking account of manufacturing tolerances and changes in dimensions due to wear.	The isolating contacts have isolating distances	P
	The withdrawable mechanism shall be fitted with a reliable indicating device which indicates	A reliable indicating device is fitted	P

	unambiguously the positions of the isolating contacts.		
	The withdrawable mechanism shall be fitted with interlocks which only permit the isolating contacts to be separated or re-closed when the main contacts of the circuit-breaker are open.	Interlocks are fitted	P
	In addition, the withdrawable mechanism shall be fitted with interlocks which only permit the main contacts to be closed		P
	– when the isolating contacts are fully closed, or		P
	– when the specified isolating distance is achieved between the fixed and moving parts of the isolating contacts (disconnected position).		P
	When the circuit-breaker is in the disconnected position, means shall be provided to ensure that the specified isolating distances between the isolating contacts cannot be inadvertently reduced.	Means are provided	P
7.1.2	**Additional requirements for circuit-breakers suitable for isolation**		-
	For additional requirements concerning performance, see 7.2.7.		P
7.1.4	**Requirements for the safety of the operator**		-
	There shall be no path or opening which allows incandescent particles to be discharged from the area of the manual operating means.	No path and opening	P
	Compliance is checked by the provisions of 8.3.2.6.1, item b).	Checked	P
7.2	**Performance requirements**		-
7.2.1	**Operating conditions**		-
7.2.1.1	**Closing**		-
	For a circuit-breaker to be closed safely on to the making current corresponding to its rated short-circuit making capacity, it is essential that it should be operated with the same speed and the same firmness as during the type test for proving the short-circuit making capacity.	It is operated with the same speed and the same firmness as during the type test	P
7.2.1.1 .1	**Dependent manual closing**		-
	For a circuit-breaker having a dependent manual closing mechanism, it is not possible to assign a short-circuit making capacity rating irrespective of the conditions of mechanical operation.		P
	Such a circuit-breaker should not be used in		P

	circuits having a prospective peak making current exceeding 10 kA.		
	However, this does not apply in the case of a circuit-breaker having a dependent manual closing mechanism and incorporating an integral fast-acting opening release which causes the circuit-breaker to break safely, irrespective of the speed and firmness with which it is closed on to prospective peak currents exceeding 10 kA; in this case, a rated short-circuit making capacity can be assigned.		P
7.2.1.1.2	**Independent manual closing**		-
	A circuit-breaker having an independent manual closing mechanism can be assigned a shortcircuit making capacity rating irrespective of the conditions of mechanical operation.		N/A
7.2.1.1.3	**Dependent power closing**		-
	The power-operated closing mechanism, including intermediate control relays where necessary, shall be capable of securing the closing of the circuit-breaker in any condition between no-load and its rated making capacity, when the supply voltage, measured during the closing operation, remains between the limits of 110 % and 85 % of the rated control supply voltage, and, when a.c., at the rated frequency.		P
	At 110 % of the rated control supply voltage, the closing operation performed on no-load shall not cause any damage to the circuit-breaker.	No any damage	P
	At 85 % of the rated control supply voltage, the closing operation shall be performed when the current established by the circuit-breaker is equal to its rated making capacity within the limits allowed by the operation of its relays or releases and, if a maximum time limit is stated for the closing operation, in a time not exceeding this maximum time limit.		P
7.2.1.1.4	**Independent power closing**		-
	A circuit-breaker having an independent power closing operation can be assigned a rated short-circuit making capacity irrespective of the conditions of power closing.		N/A

	Means for charging the operating mechanism, as well as the closing control components, shall be capable of operating in accordance with the manufacturer's specification.		N/A
7.2.1.1 .5	**Stored energy closing**		-
	This type of closing mechanism shall be capable of ensuring closing of the circuit-breaker in any condition between no-load and its rated making capacity.	It is capable of ensuring closing of the circuit-breaker	P
	When the stored energy is retained within the circuit-breaker, a device shall be provided which indicates when the storing mechanism is fully charged.	The device is provided	P
	Means for charging the operating mechanism, as well as the closing control components, shall be capable of operating when the auxiliary supply voltage is between 85 % and 110 % of the rated control supply voltage.		P
	It shall not be possible for the moving contacts to move from the open position unless the charge is sufficient for satisfactory completion of the closing operation.	No possible	P
	When the energy storing mechanism is manually operated, the direction of operation shall be indicated.	The direction is indicated	P
	This last requirement does not apply to circuit-breakers with an independent manual closing operation.		P
7.2.1.2	**Opening**		-
7.2.1.2 .1	**General**		-
	Circuit-breakers which open automatically shall be trip-free and, unless otherwise agreed between manufacturer and user, shall have their energy for the tripping operation stored prior to the completion of the closing operation.	Circuit-breakers are trip-free and have their energy for the tripping operation stored prior to the completion of the closing operation.	P
7.2.1.2 .4	**Opening by over-current releases**		-
	a) Opening under short-circuit conditions		-
	The short-circuit release shall cause tripping of the circuit-breaker with an accuracy of ±20 % of the tripping current value of the current setting for all values of the current setting of the short-circuit current release.		P

	b) Opening under overload conditions		-
	1) Instantaneous or definite time-delay operation		-
	The release shall cause tripping of the circuit-breaker with an accuracy of ±10 % of the tripping current value of the current setting for all values of current setting of the overload release.		P
	2) Inverse time-delay operation		-
	Conventional values for inverse time-delay operation are given in Table 6.		P
	At the reference temperature (see 4.7.3) and at 1,05 times the current setting (see 2.4.37 of IEC 60947-1), i.e. with the conventional non-tripping current (see 2.5.30 of IEC 60947-1), the opening release being energized on all phase poles, tripping shall not occur in less than the conventional time (see 2.5.30 of IEC 60947-1) from the cold state, i.e. with the circuitbreaker at the reference temperature.		P
	Moreover, when at the end of the conventional time the value of current is immediately raised to 1,30 times the current setting, i.e. with the conventional tripping current (see 2.5.31 of IEC 60947-1), tripping shall then occur in less than the conventional time later.		P
	The width of the temperature band shall be at least 10 K on either side of the reference temperature.	10 K	P
7.2.2	**Temperature-rise**		-
7.2.2.1	**Temperature-rise limits**		-
	The temperature-rises of the several parts of a circuit-breaker, measured under the conditions specified in 8.3.2.5, shall not exceed the limiting values stated in Table 7, during the tests made in accordance with 8.3.3.6. The temperature-rises of the terminals shall not exceed the limiting values stated in Table 7 during the tests made in accordance with 8.3.4.4 and 8.3.6.3.	No exceeding	P
7.2.2.2	**Ambient air temperature**		-
	The temperature-rise limits given in Table 7 are applicable only if the ambient air temperature remains within the limits given in 6.1.1 of IEC 60947-1.		P
7.2.2.3	**Main circuit**		-

	The main circuit of a circuit-breaker, including the over-current releases which may be associated with it, shall be capable of carrying the conventional thermal current (*I*th or *I*the, as applicable, see 4.3.2.1 and 4.3.2.2) without the temperature-rises exceeding the limits specified in Table 7.		P
7.2.2.4	**Control circuits**		-
	The control circuits, including control circuit devices, used for the closing and opening operations of a circuit-breaker, shall permit the rated duty, as specified in 4.3.4, and also the temperature-rise tests under the test conditions specified in 8.3.2.5, to be made without the temperature rises exceeding the limits specified in Table 7.		P
	The requirements of this subclause shall be verified on a new circuit-breaker. Alternatively, at the discretion of the manufacturer, the verification may be made during the temperature-rise test of 8.3.3.6.	Verified as required	P
7.2.2.5	**Auxiliary circuits**		-
	Auxiliary circuits, including auxiliary devices, shall be capable of carrying their conventional thermal current without the temperature-rises exceeding the limits specified in Table 7, when tested in accordance with 8.3.2.5.		N/A
7.2.3	**Dielectric properties**		-
	Type tests shall be made in accordance with 8.3.3.2.		P
	The verification of dielectric withstand during all test sequences shall be made in accordance with 8.3.3.5.		P
	Routine tests shall be made in accordance with 8.4.5.		P
7.2.3.2	**Power-frequency withstand voltage of the main, auxiliary and control circuits**		-
	Power-frequency tests are used in the following cases:		-
	– dielectric tests as type tests for the verification of solid insulation;		P
	– dielectric withstand verification, as a criterion of failure, after switching or short-circuit type tests;		P
	– routine tests.		P

7.2.3.5	**Solid insulation**		-
	Solid insulation shall be verified by either power-frequency tests, in accordance with 8.3.3.4.1, item 3), of IEC 60947-1, or d.c. tests (test voltages for d.c. tests are under consideration).	Verified	P
	For the purposes of this standard, circuits incorporating solid-state devices shall be disconnected for the tests.	Disconnected	P
7.2.4	**Ability to make and break under no load, normal load and overload conditions**		-
7.2.4.1	**Overload performance**		-
	This requirement applies to circuit-breakers of rated current up to and including 630 A.		P
	The circuit-breaker shall be capable of carrying out the number of operating cycles with current in the main circuit exceeding its rated current, under the test conditions according to 8.3.3.4.		P
	Each operating cycle consists of a making operation followed by a breaking operation.		P
7.2.4.2	**Operational performance capability**		-
	The circuit-breaker shall be capable of meeting the requirements of Table 8:		P
	– for the test of operational performance without current in the main circuit under the test conditions specified in 8.3.3.3.3;		P
	– for the test of operational performance with current in the main circuit under the test conditions specified in 8.3.3.3.4.		P
	Each operating cycle consists of, either a closing operation followed by an opening operation (test of operational performance without current), or a making operation followed by a breaking operation (test of operational performance with current).		P
7.2.5	**Ability to make and break under short-circuit conditions**		-
	The rated short-circuit making capacity shall be in accordance with 4.3.5.1 and 4.3.5.3.		P
	The rated short-circuit breaking capacity shall be in accordance with 4.3.5.2.		P
	The rated short-time withstand current shall be in accordance with 4.3.5.4.		P
7.2.8	**Specific requirements for integrally fused circuit-breakers**		

	An integrally fused circuit-breaker shall comply with this standard in all respects up to the rated ultimate short-circuit breaking capacity. In particular, it shall meet the requirements of test sequence V (see 8.3.7).	Comply with the requirements	P
	The circuit-breaker shall function, without causing the fuses to operate, at the occurrence of over-currents not exceeding the selectivity limit current *I*s declared by the manufacturer.		P
	For all over-currents up to and including the rated ultimate short-circuit breaking capacity assigned to the composite unit, the circuit-breaker shall open when one or more fuses operate (in order to prevent single-phasing). If the circuit-breaker is stated by the manufacturer to be with lock-out device preventing closing (see 2.14), it shall not be possible to reclose the circuitbreaker until either the melted fuse-links or any missing fuse-links have been replaced or the lock-out means has been reset.		P
7.2.9	**Co-ordination between a circuit-breaker and another short-circuit protective device**		-
	For the co-ordination between a circuit-breaker and another short-circuit protective device, see Annex A.		P
8	**Tests**		-
8.1	**Kind of tests**		-
8.1.1	The tests to verify the characteristics of circuit-breakers are:		-
	– type tests (see 8.3); – routine tests (see 8.4); – special tests (see 8.5).		-
	Type tests shall be carried out by the manufacturer, in his workshop or at any suitable laboratory of his choice.		P
8.1.3	Routine tests comprise the tests listed in 8.4.		P
8.3	**Type tests**		-
8.3.1	**Test sequences**		-
8.3.1.1	**General**		-
	Type tests are grouped together in a number of sequences, as shown in Table 9.		P
	For each sequence, tests shall be made in the order listed unless otherwise specified in this standard.		P

8.3.1.2	**Tests omitted from sequence I and made separately**		-
	With reference to 8.1.1 of IEC 60947-1, the following tests of test sequence I (see 8.3.3) may be omitted from the sequence and made on separate samples:		P
	– tripping limits and characteristics (8.3.3.1); in which case the sample(s) tested in the sequence shall be subjected to the tests of 8.3.3.1.3, only on the phase poles at the maximum setting, at room temperature and without the additional test of item b) to verify the time-current characteristic;		P
	– test of dielectric properties (8.3.3.2);		P
	– test of under-voltage releases of 8.3.3.3.2 (item c) and 8.3.3.3.3, to verify the requirements of 7.2.1.3 of IEC 60947-1, and tests of under-voltage releases at alternative frequencies (see 8.3.2.1);		P
	– test of shunt releases of 8.3.3.3.2 (item d) and 8.3.3.3.3, to verify the requirements of 7.2.1.4 of IEC 60947-1, and tests of shunt releases at alternative frequencies (see 8.3.2.1);		P
	– additional tests for operational capability without current for withdrawable circuit-breakers (8.3.3.3.5).		N/A
8.3.1.3	**Applicability of sequences according to the relationship between short-circuit ratings**		-
	The applicability of test sequences according to the relationship between *I*cs, *I*cu and *I*cw is given in Table 9a.		P
8.3.1.4	**Alternative test programmes for circuit-breakers of a given frame size and design having a different number of poles**		-
	Compliance with the test requirements is met by carrying out one of the alternative programmes 1 or 2 below.		P
	– Programme 1: The applicable test sequences according to Table 9 shall be carried out on the three-pole variant. In addition, where applicable, the tests or test sequences listed in Table 9b shall be carried out on the other variants.		P
	– Programme 2: The applicable test sequences according to Table 9 shall be carried out on the four-pole variant. In addition, where applicable,		N/A

	the tests or test sequences listed in Table 9c shall be carried out on the other variants.		
	The principle for the application of the alternative test programmes is illustrated below:		P
8.3.2.1	**General requirements**		-
	Unless otherwise agreed by the manufacturer, each test sequence shall be made on a sample circuit-breaker (or set of samples) in a clean and new condition.	Each test sequence is made in a clean and new condition.	P
	The number of samples to be tested for each test sequence and the test conditions (for example setting of overload releases, terminal connections), according to the circuit-breaker parameters, are given in Table 10 or, where applicable, for the alternative test programmes in Table 9b and Table 9c (see 8.3.1.4).	See Table 9b	P
	Where necessary, additional information is given in the relevant subclauses.		P
	Unless otherwise specified, tests are to be performed on a circuit-breaker having the maximum rated current for a given frame size and are deemed to cover all rated currents of that frame size.		P
	In the case of one or more construction breaks (see 2.1.2 and 7.1.5) within the frame size, further samples shall be tested in accordance with Table 9b and/or Table 10 as applicable.		P
	Unless otherwise stated, short-circuit releases shall be set at maximum (time and current) for all tests.		P
	Circuit-breakers shall be tested in free air.	Tested in free air	P
	If a circuit-breaker may be used in specified individual enclosures and has been tested in free air, it shall be additionally tested in the smallest of such enclosures stated by the manufacturer, using a new sample, according to 8.3.5, at *U*e max/corresponding *I*cu, with release settings at maximum (see table footnote a of Table 10).		N/A
	Details of these tests, including the dimensions of the enclosure, shall be stated in the test report.		P
	However, if a circuit-breaker may be used in specified individual enclosures and is tested		N/A

	throughout in the smallest of such enclosures stated by the manufacturer, the tests in free air need not be made provided that such enclosure is bare metallic, without insulation. Details, including the dimensions of the enclosure, shall be stated in the test report.		
	The characteristics of the metallic screen shall be as follows:		P
	– 0,5 mA per pole for equipment of utilization category AC-20A, AC-20B, DC-20A or DC-20B;		N/A
	– 2 mA per pole for equipment of all other utilization categories.		P
8.3.2.2	**Test quantities**		-
8.3.2.2 .3	**Frequency of the test circuit for a.c.**		-
	All tests shall be made at the rated frequency of the circuit-breaker. For all short-circuit tests, if the rated breaking capacity is essentially dependent on the value of the frequency, the tolerance shall not exceed ±5 %.	No exceeding	P
	If the manufacturer declares the rated breaking capacity to be substantially unaffected by the value of the frequency, the tolerance shall not exceed ±25 %.	No exceeding	P
8.3.2.3	**Evaluation of test results**		-
	The condition of the circuit-breaker after tests shall be checked by the verifications applicable to each sequence.	Checked	P
	A circuit-breaker is deemed to have met the requirements of this standard if it meets the requirements of each sequence as applicable.		P
	The case shall not be broken but hairline cracks are acceptable.	No break	P
8.3.2.5	**Test conditions for temperature-rise test**		-
	The circuit-breaker shall meet the requirements of 7.2.2.		P
	The circuit-breaker shall be mounted in accordance with 8.3.2.1.		P
	During the temperature rise test of sequence I (see 8.3.3.6) coils of under-voltage releases, where applicable, shall be supplied at one rated frequency and corresponding voltage, chosen at random. Additional tests to verify coils at other rated frequencies and voltages shall be made outside the sequence.		P

	For four-pole circuit-breakers, a test shall first be made on the three poles which incorporate over-current releases. For a circuit-breaker having a value of rated current not exceeding 63 A, an additional test shall be made by passing the test current through the fourth pole and its adjacent pole. For higher rated current values, the method of testing shall be the subject of a separate agreement between manufacturer and user.		N/A
8.3.2.6	**Test conditions for short-circuit tests**		-
8.3.2.6 .1	**General requirements**		-
	Subclause 8.3.4.1.1 of IEC 60947-1 is amplified as follows:		P
	a) The circuit-breaker shall be mounted in accordance with 8.3.2.1.		P
	b) Unless it can be shown that, with the manual operating means in any opening around the manual operating means through which a music diameter can be inserted so as to reach the arc chamber area, arrangement shall apply: For opening operations only, a clear, low density polyethylene sheet, 0,05 mm±0,01 mm thick, of a size 100 mm ×100 mm, positioned as shown in Figure 1, fixed and reasonably stretched in a frame, is placed at a distance of 10 mm from – either the maximum projection of the manual closing means of a circuit-breaker without recess for this closing means; – or the rim of the recess for the manual closing means of a circuit-breaker with recess for this closing means. The polyethylene sheet shall have the following physical properties: – density at 23 °C: 0,92 g/cm^3 ±0,05 g/cm^3; – melting point: 110 °C to 120 °C.		P
	c) The circuit-breaker shall be operated during tests to simulate service conditions as closely as possible. A circuit-breaker having a dependent power operation shall be closed during tests with the control supply (voltage or pressure) at 85 % of its rated value. A circuit-breaker having an independent power		P

	operation shall be closed during tests with the operating mechanism charged to its maximum value stated by the manufacturer. A circuit-breaker having a stored energy operation shall be closed during tests with the operating means charged at 85 % of the rated voltage of the auxiliary supply.		
	d) If a circuit-breaker is fitted with adjustable over-current releases, the setting of these releases shall be as specified for each test sequence.		P
	e) For all these tests, the line side of the test circuit shall be connected to the corresponding terminals of the circuit-breaker as marked by the manufacturer. In the absence of such markings, the test connections shall be as specified in Table 10.		P
8.3.3	**Test sequence I: General performance characteristics**		-
	The number of samples to be tested and the setting of adjustable releases shall be in accordance with Table 10.		P
	See 8.3.1 for tests that may be omitted from the sequence and made on separate samples.		P
8.3.3.1	**Test of tripping limits and characteristics**		-
	Subclause 8.3.3.2 of IEC 60947-1 is amplified as follows:		P
8.3.3.1 .1	**General**		-
	The ambient air temperature shall be measured as for the temperature-rise tests (see 8.3.2.5).	23°C	P
	When the over-current opening release is normally a built-in part of the circuit-breaker, it shall be verified inside the corresponding circuit-breaker.		P
	Any separate release shall be mounted approximately as under normal service conditions. The complete circuit-breaker shall be mounted in accordance with 8.3.2.1. The equipment under test shall be protected against undue external heating or cooling.	Any separate release are mounted approximately	P
	The connections of the separate release, if appropriate, or of the complete circuit-breaker shall be made as for normal service, with conductors of cross-section corresponding to		P

	the rated current (*I*n) (see Tables 9 and 10 of 8.3.3.3.4 of IEC 60947-1) and of length according to 8.3.3.3.4 of IEC 60947-1.		
	For circuit-breakers with adjustable over-current releases, tests shall be made at		N/A
	a) minimum current setting and minimum time-delay setting, as applicable, and		P
	b) maximum current setting and maximum time-delay setting, as applicable,		P
	in each case with conductors corresponding to the rated current *I*n (see 4.7.2).		N/A
	For circuit-breakers having a neutral pole provided with an overload release, the verification of this overload release shall be made on the neutral pole alone.		N/A
8.3.3.1 .2	**Opening under short-circuit conditions**		-
	The operation of short-circuit releases (see 4.7.1) shall be verified at 80 % and 120 % of the short-circuit current setting of the release. The test current shall have no asymmetry.	The test current have no asymmetry	P
	At a test current having a value equal to 80 % of the short-circuit current setting, the release shall not operate, the current being maintained:		P
	– for 0,2 s in the case of instantaneous releases (see 2.20); – for an interval of time equal to twice the time-delay stated by the manufacturer, in the case of definite time-delay releases.	0,2 s	P
	At a test current having a value equal to 120 % of the short-circuit current setting, the release shall operate:		P
	– within 0,2 s in the case of instantaneous releases (see 2.20); – within an interval of time equal to twice the time-delay stated by the manufacturer, in the case of definite time-delay releases.	within 0,2 s	P
	For circuit-breakers with an electronic overcurrent release, the operation of the short-circuit releases shall be verified by one test only on each pole individually.		P
	For circuit-breakers with electromagnetic overcurrent releases, the operation of multipole short-circuit releases shall be verified by one		N/A

	test only on each combination of two phase poles in series. For circuit-breakers having an identified neutral pole provided with a short-circuit release, the neutral pole shall be tested in series with one phase pole chosen at random. In addition, the operation of the short-circuit releases shall be verified once on each pole individually, at the value of the tripping current declared by the manufacturer for individual poles at which value they shall operate:		
	- within 0,2 s in the case of instantaneous releases (see 2.20); - within an interval of time equal to twice the time-delay stated by the manufacturer, in the case of definite time-delay releases.		N/A
	Definite time-delay releases shall, in addition, comply with the requirements of 8.3.3.1.4.		P
8.3.3.1.3	**Opening under overload conditions**		P
	a) Instantaneous or definite time-delay releases		-
	The operation of instantaneous or definite time-delay overload releases (see note 1 of 4.7.1) shall be verified at 90 % and 110 % of the overload setting of the release. The test current shall have no asymmetry. The operation of multipole overload releases shall be verified with all phase poles loaded simultaneously with the test current.		P
	Definite time-delay releases shall, in addition, comply with the requirements of 8.3.3.1.4.		P
	At a test current having a value equal to 90 % of the current setting, the release shall not operate, the current being maintained		P
	– for 0,2 s in the case of instantaneous releases (see 2.20), – for an interval of time equal to twice the time-delay stated by the manufacturer, in the case of definite time-delay releases.	0,2 s	P
	At a test current having a value equal to 110 % of the current setting, the release shall operate		P
	– within 0,2 s in the case of instantaneous releases (see 2.20), – within an interval of time equal to twice the time-delay stated by the manufacturer, in the	within 0,2 s	P

	case of definite time-delay releases.		
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test current for this release shall have a value equal to 1,2 times 110 % of the current setting.		N/A
	b) Inverse time-delay releases		-
	The operating characteristics of inverse time-delay overload releases shall be verified in accordance with the performance requirements of 7.2.1.2.4, item b), 2).	Verified	P
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test currents for this release shall be those given in Table 6 except that the test current at the conventional tripping current shall be multiplied by the factor 1,2.		N/A
	For releases dependent on ambient air temperature, the operating characteristic shall be verified at the reference temperature (see 4.7.3 and 5.2, item b)), the release being energized on all phase poles.	Verified	P
	If this test is made at a different ambient air temperature, a correction shall be made in accordance with the manufacturer's temperature/current data.		N/A
	For thermal-magnetic releases declared by the manufacturer to be independent of ambient air temperature, the operating characteristic shall be verified by two measurements, one at 30 °C ± 2 °C, the other at 20 °C ± 2 °C or at 40 °C ± 2 °C, the release being energized on all phase poles.		N/A
	For electronic releases, the operating characteristic shall be verified at the ambient temperature of the test room (see 6.1.1 of IEC 60947-1), the release being energised on all phase poles.		P
8.3.3.2	**Test of dielectric properties**		-
	Subclause 8.3.3.4.1 of IEC 60947-1 applies, except for item 5), with the following additions:		-
	(i) with reference to 8.3.3.4.1, item 2) c) i) and ii), of IEC 60947-1: the normal positions of operation include the tripped position, if any;		P
	(ii) with reference to 8.3.3.4.1, item 3 c), of IEC		P

	60947-1: for the purposes of this standard circuits incorporating solid-state devices connected to the main circuit shall be disconnected for the test;		
	(iii) circuit-breakers not declared as suitable for isolation shall be tested with the test voltage applied across the poles of the main circuit, the line terminals being connected together and the load terminals being connected together. The test voltage shall be in accordance with Table 12 of IEC 60947-1;		P
	(iv) for circuit-breakers suitable for isolation (see 3.5) and having an operational voltage greater than 50 V, the leakage current, measured through each pole with the contacts in the open position, at a test voltage of 1,1 *U*e, shall not exceed 0,5 mA.		N/A
8.3.3.3	**Tests of mechanical operation and of operational performance capability**		-
8.3.3.3 .1	**General test conditions**		-
	The circuit-breaker shall be mounted in accordance with 8.3.2.1 except that, for the purpose of these tests, the circuit-breaker may be mounted on a metal frame. The circuit-breaker shall be protected against undue external heating or cooling.	The circuit-breaker is mounted in accordance with 8.3.2.1	P
	The tests shall be made at the ambient temperature of the test room.	23°C	P
	The control supply voltage of each control circuit shall be measured at its terminals at the rated current.	Measured as requried	P
	All resistors or impedances forming part of the control device shall be in circuit, However, no supplementary impedances shall be inserted between the current source and the terminals of the device.		P
	The tests of 8.3.3.3.2, 8.3.3.3.3 and 8.3.3.3.4 shall be made on the same circuit-breaker but the order in which these tests are carried out is optional. However, for the tests of undervoltage and shunt releases the tests of 8.3.3.3.2 and 8.3.3.3.3 may, alternatively, be made on a new sample.		P
8.3.3.3	**Construction and mechanical operation**		-

.2			
	a) Construction		-
	A withdrawable circuit-breaker shall be checked for the requirements stated in 7.1.1.	Checked	P
	A circuit-breaker with stored energy operation shall be checked for compliance with 7.2.1.1.5, regarding the charge indicator and the direction of operation of manual energy storing.	Checked	P
	b) Mechanical operation		-
	Tests shall be made as specified in 8.3.3.3.1 for the following purposes:		P
	– to prove satisfactory tripping of the circuit-breaker with the closing device energized; – to prove satisfactory behaviour of the circuit-breaker when the closing operation is initiated with the tripping device actuated; – to prove that the operation of a power-operated device, when the circuit-breaker is already closed, shall neither cause damage to the circuit-breaker nor endanger the operator.		P
	The mechanical operation of a circuit-breaker may be checked under no-load conditions.		P
	A circuit-breaker with dependent power operation shall comply with the requirements stated in 7.2.1.1.3.		P
	A circuit-breaker with dependent power operation shall operate with the operating mechanism charged to the minimum and maximum limits stated by the manufacturer.		P
	A circuit-breaker with stored energy operation shall comply with the requirements stated in 7.2.1.1.5 with the auxiliary supply voltage at 85 % and 110 % of the rated control supply voltage. It shall also be verified that the moving contacts cannot be moved from the open position when the operating mechanism is charged to slightly below the full charge as evidenced by the indicating device.		P
	For a trip-free circuit-breaker it shall not be possible to maintain the contacts in the touching or closed position when the tripping release is in the position to trip the circuitbreaker.		P
	If the closing and opening times of a circuit-breaker are stated by the manufacturer,		N/A

	such times shall comply with the stated values.		
	c) Undervoltage releases		N/A
	d) Shunt releases		N/A
8.3.3.3.3	**Operational performance capability without current**		-
	These tests shall be made under the conditions specified in 8.3.2.1. The number of operating cycles to be carried out on the circuit-breaker is given in column 3 of Table 8; the number of operating cycles per hour is given in column 2 of this table.	These tests are made under the conditions specified in 8.3.2.1	P
	The tests shall be carried out without current in the main circuit of the circuit-breaker.		P
	For circuit-breakers which can be fitted with shunt releases, 10 % of the total number of operating cycles shall be closing/tripping operations, with the shunt release energized at maximum rated control supply voltage.		P
	For circuit-breakers which can be fitted with undervoltage releases, 10 % of the total number of operating cycles shall be closing/tripping operations at the minimum rated control supply voltage, this voltage to the release being removed after each closing operation, to trip the circuit-breaker.		N/A
	In each case, half the relevant number of operating cycles shall be made at the beginning and the other half at the end of the tests.		N/A
	For circuit-breakers fitted with undervoltage releases, prior to the operational performance test, without the undervoltage release being energized, it shall be verified that the circuit-breaker cannot be closed by attempting 10 times to effect a closing operation of the circuit-breaker.		N/A
	The tests shall be made on a circuit-breaker with its own closing mechanism. In the case of circuit-breakers fitted with electrical or pneumatic closing devices, these devices shall be supplied at their rated control supply voltage or at their rated pressure. Precautions shall be taken to ensure that the temperature-rises of the electrical components do not exceed the limits indicated in Table 7.		P
	In the case of manually operated		P

	circuit-breakers, they shall be operated as in normal use.		
8.3.3.3 .4	**Operational performance capability with current**		-
	The circuit-breaker condition and method of installation shall be as specified in 8.3.2.1, the test circuit being in accordance with 8.3.3.5.2 of IEC 60947-1.		P
	The operating rate and the number of operating cycles to be carried out are given in columns 2 and 4 of Table 8.		P
	The circuit-breaker shall be operated so as to make and break its rated current at its maximum rated operational voltage, assigned by the manufacturer, at a power factor or time constant as applicable in accordance with Table 11, the tolerance being in accordance with 8.3.2.2.2.		P
	Tests on a.c. rated circuit-breakers shall be made at a frequency between 45 Hz and 62 Hz.	50 Hz	P
	For circuit-breakers fitted with adjustable releases, the tests shall be made with the overload setting at maximum and the short-circuit setting at minimum.		P
	The tests shall be made on a circuit-breaker with its own closing mechanism. In the case of circuit-breakers fitted with electrical or pneumatic closing devices, these devices shall be supplied at their rated control supply voltage or at their rated pressure. Precautions shall be taken to ensure that the temperature rises of the electrical components do not exceed the values indicated in Table 7.		P
	Manually operated circuit-breakers shall be operated as in normal use.		P
8.3.3.4	**Overload performance**		-
	This test applies to circuit-breakers of rated current up to and including 630 A.		P
	The circuit-breaker condition and method of installation shall be as specified in 8.3.2.1, and the test circuit in accordance with 8.3.3.5.2 of IEC 60947-1.		P
	The test shall be made at a voltage corresponding to the maximum operational voltage *U*e max assigned by the manufacturer to the circuit-breaker, taking into account the		P

	requirement for recovery voltage of Table 12 (see also 8.3.2.2.3 a) of IEC 60947-1).		
	For circuit-breakers fitted with adjustable releases, the test shall be made with its releases set at maximum.		P
	The circuit-breaker shall be opened nine times manually and three times automatically by the action of an overload release, except for circuit-breakers having a short-circuit release of a maximum setting less than the test current, in which case all 12 operations shall be automatic.	The circuit-breaker is opened nine times manually and three times automatically	P
	During each of the manually operated cycles, the circuit-breaker shall remain closed for a time sufficient to ensure that the full current is established, but not exceeding 2 s.	No exceeding	P
	The number of operating cycles per hour shall be that specified in column 2 of Table 8. If the circuit-breaker does not latch in at the specified rate, this rate may be reduced sufficiently so that the circuit-breaker may be closed, the full current being established.		P
	If test conditions at the testing station do not permit testing at the operating rate given in Table 8, a slower rate may be used, but details shall be stated in the test report.		N/A
	The values of the test current and of the recovery voltage shall be in accordance with Table 12, at the power factor or time constant, as applicable, in accordance with Table 11, the tolerances being in accordance with 8.3.2.2.2.		P
	Tests on a.c. rated circuit-breakers shall be made at a frequency between 45 Hz and 62 Hz.	50 Hz	P
	The prospective current at the supply terminals of the circuit-breaker shall be at least 10 times the test current, or at least 50 kA, whichever of the two values is the lower.		P
8.3.4	**Test sequence II: Rated service short-circuit breaking capacity**		-
	The number of samples to be tested and the setting of adjustable releases shall be in accordance with Table 10.		P
8.3.4.1	**Test of rated service short-circuit breaking capacity**		-
	A short-circuit test is made under the general conditions of 8.3.2, with a value of prospective		P

	current *I*cs, as declared by the manufacturer, in accordance with 4.3.5.2.2.		
	The power factor for this test shall be according to Table 11, for the appropriate test current.		P
	In the case of integrally fused circuit-breakers, any blown fuse shall be replaced after each operation. The time interval t may need to be extended for this purpose.		P
	The sequence of operations shall be:		P
	O – *t* – CO – *t* – CO		
8.3.5	**Test sequence III: Rated ultimate short-circuit breaking capacity**		-
	Except where the test sequence VI (combined) applies (see 8.3.8), this test sequence applies to circuit-breakers of selectivity category A and to circuit-breakers of selectivity category B having a rated ultimate short-circuit breaking capacity higher than the rated short-time withstand current.		P
	For circuit-breakers of selectivity category B having a rated short-time withstand current equal to their rated ultimate short-circuit breaking capacity, this test sequence need not be made, since, in this case, the ultimate short-circuit breaking capacity is verified when carrying out test sequence IV.		N/A
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.		P
8.3.5.2	**Test of rated ultimate short-circuit breaking capacity**		-
	Following the test according to 8.3.5.1, a short-circuit breaking capacity test is made with a value of prospective current equal to the ultimate rated short-circuit breaking capacity as declared by the manufacturer, under the general conditions according to 8.3.2.		P
	The sequence of operations shall be:		P
	O – *t* – CO		P
8.3.6	**Test sequence IV: Rated short-time withstand current**		-
	Where integrally fused circuit-breakers are of selectivity category B, they shall meet the requirements of this sequence.		P
	The number of samples to be tested and the setting of adjustable releases shall be in		P

	accordance with Table 10.		
8.3.6.2	**Test of rated short-time withstand current**		-
	Subclause 8.3.4.3 of IEC 60947-1 applies with the following addition:		P
	For the purpose of this test only, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.	Any over-current release are rendered inoperative	P
8.3.6.4	**Test of short-circuit breaking capacity at the maximum short-time withstand current**		-
	Following the test according to 8.3.6.3, a short-circuit test shall be made with the following sequence of operations:		P
	O – *t* – CO		P
	under the general conditions of 8.3.2, with a value of prospective current equal to that of the short-time withstand current test (see 8.3.6.2) and at the highest voltage applicable to the rated short-time withstand current.		P
	The circuit-breaker shall remain closed for the short-time corresponding to the maximum available time setting of the short-time delay short-circuit release, and the instantaneous override, if any, shall not operate. If the circuit-breaker has a making current release (see 2.10), this requirement does not apply to the CO operation, if the prospective current exceeds the pre-determined value, since it will then operate.		P
8.3.7	**Test sequence V: Performance of integrally fused circuit-breakers**		-
	This test sequence is divided into two stages:		P
	– Stage 1 comprises the tests according to 8.3.7.1 to 8.3.7.3; – Stage 2 comprises the tests according to 8.3.7.4 to 8.3.7.8.		P
	Tests according to 8.3.7.1, 8.3.7.5 and 8.3.7.6 shall be made at the maximum operational voltage of the circuit-breaker.		P
	The number of samples to be tested and the setting of adjustable releases shall be in accordance with Table 10.		P
8.3.7.1	**Short-circuit at the selectivity limit current**		-
	A short-circuit test is made under the general conditions of 8.3.2, with a value of prospective		P

	current equal to the selectivity limit current, as declared by the manufacturer (see 2.17.4).		
	For the purpose of this test the fuses shall be fitted.	Fitted	P
	The test shall consist of one O operation at the conclusion of which the fuses shall still be intact.		P
8.3.7.5	**Short-circuit at 1,1 times the take-over current**		-
	Following the test according to 8.3.7.4 a short-circuit test is made under the same general conditions as in 8.3.7.1, with a value of prospective current equal to 1,1 times the take-over current declared by the manufacturer (see 2.17.6).		P
	For the purpose of this test the fuses shall be fitted.	Fitted	P
	The test shall consist of one "O" operation at the conclusion of which at least two of the fuses shall have blown.	Two of the fuses have blown	P
8.3.7.6	**Short-circuit at rated ultimate short-circuit breaking capacity**		-
	Following the test according to 8.3.7.5, a short-circuit test is made under the same general conditions as in 8.3.7.1, with a value of prospective current equal to the ultimate short-circuit breaking capacity *I*cu, as declared by the manufacturer.		P
8.3.8	**Test sequence VI: combined test sequence**		-
	At the discretion of, or in agreement with the manufacturer, this test sequence may be applied to circuit-breakers of selectivity category B:		P
	a) when the rated short-time withstand current and the rated service short-circuit breaking capacity have the same value (*I*cw = *I*cs); in this case it replaces test sequences II and IV;		P
	b) when the rated short-time withstand current, the rated service short-circuit breaking capacity and the rated ultimate short-circuit breaking capacity have the same value (*I*cw = *I*cs = *I*cu); in this case it replaces test sequences II, III and IV.		N/A
8.4	**Routine tests**		-
8.4.1	**Mechanical operation tests**		-
	The tests of 8.4.1.1 and 8.4.1.2 shall be carried	No adjustments are made and	P

	out without current in the main circuit, except when required for the operation of releases. During the tests, no adjustments shall be made and the operation shall be satisfactory.	the operation is satisfactory	
8.4.1.1	The following tests shall be made on manually-operated circuit-breakers:		-
	– two close-open operations;		P
	– two trip-free operations.		P
8.4.1.2	The following tests shall be made on power-operated circuit-breakers at 110 % of the maximum rated control supply voltage and/or of the rated supply pressure, and at 85 % of the minimum rated control supply voltage and/or of the rated supply pressure:		N/A
	– two close-open operations;		N/A
	– two trip-free operations;		N/A
	– for automatic reclosing circuit-breakers, two automatic reclosing operations.		N/A
8.4.5	**Dielectric tests**		-
	The test conditions shall be in accordance with 8.3.3.4.1, item 1), of IEC 60947-1, except that the use of metal foil is not required. The test voltage shall be applied as follows:		P
	– with the circuit-breaker in the open position, between each pair of terminals which are electrically connected together when the circuit-breaker is closed;		P
	– for circuit-breakers not incorporating electronic circuits connected to the main poles, with the circuit-breaker in the closed position, between each pole and the adjacent pole(s), and between each pole and the frame, if applicable;		
	– for circuit-breakers incorporating electronic circuits connected to the main poles, with the circuit-breaker in the open position, between each pole and the adjacent pole(s), and between each pole and the frame, if applicable, either on the incoming side or on the outgoing side, depending on the position of the electronic components.		P
	Alternatively, disconnection of electronic circuits connected to the main poles is permitted, in which case the test voltage shall be applied with the circuit-breaker in the closed position, between each pole and the adjacent pole(s),		P

	and between each pole and the frame, if applicable.		
	The method of test shall be as in a), b) or c) below at the manufacturer's discretion:		P
	a) Two tests shall be made:		-
	1) Impulse withstand voltage		P
	2) Power frequency withstand voltage		P
	b) A single power frequency test in accordance with item a) 2) above at a test voltage such that the peak value of the sinusoidal wave corresponds to the highest of the peak values of the following: 30 % of *U*imp , 2 *U*i , 2 *U*e max or 1 000 V r.m.s.		P
	c) An insulation resistance test at 500 V d.c.. The insulation resistance shall be not less than 1 MΩ at any point.	No less than 1 MΩ	P
	If dielectric properties are tested according to a sampling plan in accordance with the note to 8.4, a power frequency withstand test shall be made according to 8.4.5, item a) 2) of this subclause, but with a test voltage in accordance with Table 12A of IEC 60947-1.		N/A

Table 1 – Preferred values of rated voltage

Circuit-breakers	AC		DC [b]	
	AC circuit supplying the circuit-breaker	Rated voltage a.c.	Rated voltage d.c.	DC wiring examples
Single-pole	Single-phase (phase to neutral)	230 V	220 V	Figure 18a
	Single-phase (phase to earthed middle conductor, or phase to neutral)	120 V	125 V	
	Single-phase (phase to neutral) or three-phase (3 single-pole circuit-breakers) (3-wire or 4-wire)	230/400 V	220 V	
Two-pole	Single-phase (phase-to-phase)	400 V	220/440 V	Figures 18b, 18c, 18d
	Single phase (phase-to-phase, 3-wire)	120/240 V [a]	125/250 V [a]	

Applicable for d.c. voltages:

[a] Also for single-pole circuit-breakers to be used in pairs at 250 V d.c. (respectively 240 V a.c.) and individually at 125 V d.c. (respectively 120 V a.c.).

[b] The rated voltage per pole shall not exceed 220 V d.c.

Applicable for a.c. voltages:

NOTE 1 In IEC 60038 the network voltage value of 230/400 V has been standardized. This value should progressively supersede the values of 220/380 V and 240/415 V.

NOTE 2 Wherever in this standard there is a reference to 230 V or 400 V, it may be read as 220 V or 240 V, and 380 V or 415 V respectively.

NOTE 3 Circuit-breakers complying with the requirements of this standard may be used in IT systems.

The manufacturer shall declare in his literature the minimum voltage for which the circuit-breaker is designed.

Table 2 – Ranges of instantaneous tripping

Type	Ranges for a.c.	Ranges for d.c.
B	Above 3 I_n up to and including 5 I_n	Above 4 I_n up to and including 7 I_n
C	Above 5 I_n up to and including 10 I_n	Above 7 I_n up to and including 15 I_n

Table 7 – Time-current operating characteristics

Test	Type	Test current a.c.	Test current d.c.	Initial condition	Limits of tripping or non-tripping time	Result to be obtained	Remarks
a	B, C	1,13 I_n		Cold*	$t \geq 1$ h ($I_n \leq 63$ A) $t \geq 2$ h ($I_n > 63$ A)	No tripping	
b	B, C	1,45 I_n		Immediately following test a	$t < 1$ h ($I_n \leq 63$ A) $t < 2$ h ($I_n > 63$ A)	Tripping	Current steadily increased within 5 s
c	B, C	2,55 I_n		Cold*	1 s < t < 60 s ($I_n \leq 32$ A) 1 s < t < 120 s ($I_n > 32$ A)	Tripping	
d	B C	3 I_n 5 I_n	4 I_n 7 I_n	Cold*	0,1 < t < 45 s ($I_n \leq 32$ A) 0,1 < t < 90 s ($I_n > 32$ A) 0,1 < t < 15 s ($I_n \leq 32$ A) 0,1 < t < 30 s ($I_n > 32$ A)	Tripping	Current established by closing an auxiliary switch
e	B C	5 I_n 10 I_n	7 I_n 15 I_n	Cold*	t < 0,1 s	Tripping	Current established by closing an auxiliary switch
* The term "cold" means without previous loading, at the reference calibration temperature.							

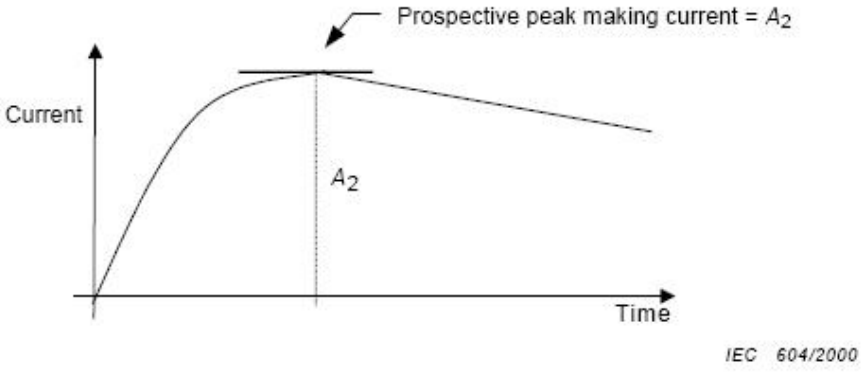
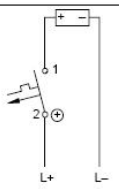
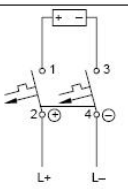
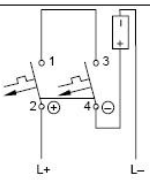
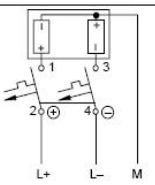


Figure 7b – Calibration of the test circuit in case of direct currents

	a			b			c			d		
Tension assignée du disjoncteur	220 V	125 V	125/250 V	220/440 V	250 V	125/250 V	220/440 V	250 V	125/250 V	220/440 V	250 V	125/250 V
Tension maximale entre les conducteurs	220 V	125 V	125 V	440 V	250 V	250 V	440 V	250 V	250 V	440 V	250 V	250 V
Tension maximale entre le conducteur et la terre	220 V	125 V	125 V	220 V	125 V	125 V	440 V [a]	250 V [a]	250 V [a]	220 V	125 V	125 V
Disjoncteur	Unipolaire			Bipolaire			Bipolaire			Bipolaire		
Circuit												

[a] Pour des applications avec pôle négatif à la terre, où la tension vers la terre est plus élevée que la tension assignée d'un disjoncteur unipolaire.

IEC 773/03

Figure 18 – Exemples de connexions de disjoncteurs dans différents systèmes à courant continu

Table C.1 – Test sequences

Test sequence		Clause or subclause	Test performed at		Test (or inspection)
A		6			Marking
		8.1.1			General
		8.1.2			Mechanism
		9.3			Indelibility of marking
		8.1.3			Clearances and creepage distances (external parts only)
		8.1.6			Non-interchangeability
		9.4			Reliability of screws, current-carrying parts and connections
		9.5			Reliability of screw-type terminals for external copper conductors
		9.6			Protection against electric shock
		8.1.3			Clearances and creepage distances (internal parts only)
		9.14			Resistance to heat
		9.15			Resistance to abnormal heat and to fire
		9.16			Resistance to rusting
B		9.7			Dielectric properties and isolating capability
		9.8			Temperature rise and power loss
		9.9			28-day test
C	C_1	9.11	a.c.		Mechanical and electrical endurance
		9.12.11.2.1			Test at reduced a.c. short-circuit currents
		9.12.12			Verification of circuit-breaker after short-circuit tests
		9.11		d.c.	Mechanical and electrical endurance
		9.12.11.2.3			Test at reduced d.c. short-circuit currents
		9.12.11.2.4			Test at small direct currents up to and including 150 A
		9.12.12			Verification of circuit-breaker after short-circuit tests
	C_2	9.12.11.2.2	a.c.		Short-circuit test for verifying the suitability of circuit-breakers for use in IT systems
		9.12.12			Verification of circuit-breaker after short-circuit tests
D	D_0	9.10	a.c.	d.c.	Tripping characteristic
	D_1	9.13	a.c.	d.c.	Mechanical stresses
		9.12.11.3			Short-circuit performance at 1 500 A
		9.12.12			Verification of circuit-breaker after short-circuit tests
E	E_1	9.12.11.4.2	a.c.	d.c.	Service short-circuit capacity (I_{cs})
		9.12.12			Verification of circuit-breaker after short-circuit tests
	E_2	9.12.11.4.3	a.c.	d.c.	Performance at rated short-circuit capacity (I_{cn})
		9.12.12			Verification of circuit-breaker after short-circuit tests

NOTE With the agreement of the manufacturer the same samples may be used for more than one sequence.

Table C.2 – Number of samples for full test procedure

Test sequence		Number of samples		Minimum number of samples which shall pass the tests [a, b]		Number of samples for repeated tests [c]	
		AC ~	DC —	AC ~	DC —	AC ~	DC —
A		1		1			
B		3		2		3	
C	C_1	3	3	2 [e]	2 [e]	3	3
	C_2	3	3	2 [e]	2 [e]	3	3
D		3	3	2 [e]	2 [e]	3	3
E_1		3 + 3 [d]	3	2 [e] + 2 [d, e]	2 [e]	3 + 3 [d]	3
E_2		3 + 4 [d]	3	2 [e] + 3 [d, e]	2 [e]	3 + 4 [d]	3

[a] In total, a maximum of two 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 results shall be acceptable.

[d] Supplementary samples in the case of single-pole circuit-breakers of rated voltage 230/400 V.

[e] All samples shall meet the test requirements of 9.12.10, 9.12.11.2, 9.12.11.3 and 9.12.11.4 as appropriate.

APPENDIX A— TEST PHOTOGRAPH






Revalco
RV30 BC316
C16
IEC60898
I ON
O OFF


Revalco
RV30 NC416
C16
IEC60898
I ON
O OFF

EC Declaration of conformity

Council Directive 2014/35/EU on Low Voltage Detector

REVALCO ELECTRIC SPAIN, S.L.

Certify that the product described is in conformity with the
Low Voltage Directive 2014/35/EU as amended

Product Name:

Miniature Circuit Breaker

Item No:

RV30 Basic model Series and RV30 Normal Model Series
Ue=240/415V~(1P),240V~(1P+N),415V~(2P,3P,3P+N,4P)
In=1, 2, 3, 4, 6, 10, 16, 20, 25, 32, 40, 50, 63A B-, C- and D- Type
IEC 60898-1:Ics=Icn=6000A,Energy limiting class 3(Only for B,C type)
IEC 60947-2:Icn=10000A, Ics=7500A,
Energy limiting class 3(Only for B,C type)

The product has been assessed by the application of the following standards:

IEC 60898-1:2019+C1:2020, IEC 60947-2:2019

Issue place and date	Company stamp and Signature of authorized personnel

REVALCO ELECTRIC SPAIN, S.L.

CE Technical Documents

Product Name: Residual Current Circuit Breaker

Applied Directive : Electromagnetic Compatibility Directive 2014/30/EU

Document No.: XMT0202200703S/EMC

Date: 2022.12.22

Revision: V0

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The product that is produced by **REVALCO ELECTRIC SPAIN, S.L.**
Test model: **RV31 AC240300, RV31 A480300** or the “EUT" as referred to in this report is a **Residual Current Circuit Breaker.**

Application model:

RV31 Series
Un = 240V~(1P+N)415V~(3P+N)
In = 16, 25, 32, 40, 50, 63, 80, 100, 125A,
I Δ n = 0.03A, 0.1A, 0.3A, 0.5A
type-AC, type-A, type-S, type-B

Difference of the series model:

The appearance is different, but the function is the same.

Objective

In order to meet the EMC requirements approved by CENELEC, the following standards will be cited:
1. EN IEC 61000-6-1:2019, Electromagnetic compatibility (EMC). Generic standards. Immunity standard for residential, commercial and light-industrial environments

2. EN IEC 61000-6-3:2021, Electromagnetic compatibility (EMC). Generic standards. Emission standard for residential, commercial and light-industrial environments

3. EN IEC 61000-3-2:2019+A1:2021, Electromagnetic compatibility (EMC). Limits. Limits for harmonic current emissions (equipment input current ≤16 A per phase)

4. EN 61000-3-3:2013+A2:2021, Electromagnetic compatibility (EMC) - Limits. Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

Equipment Modifications

No modification to the EUT was made by XMTEST to make sure the EUT comply with applicable limits.

Note: The test data is only valid for the test sample. There is possible deviation from the original test data for other products

EN IEC 61000-6-3

3.1 Continuous Disturbance Voltage at Mains Terminal.

3.1.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
No.2 Radio factory of Changzhou	Screened Room	P-22	No	12/6/21	12/5/23
AFJ	EMI Receiver	ER55 CR/2.8	55790015165	12/6/21	12/5/23
AFJ	16A LINE Impedance Stabilization	LS16C	16010020077	12/6/21	12/5/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

3.1.2 Description of Measurement Conditions

Temperature: 21℃
Humidity: 58%
Pressure: 1033mbar
Electromagnetic environment: normal

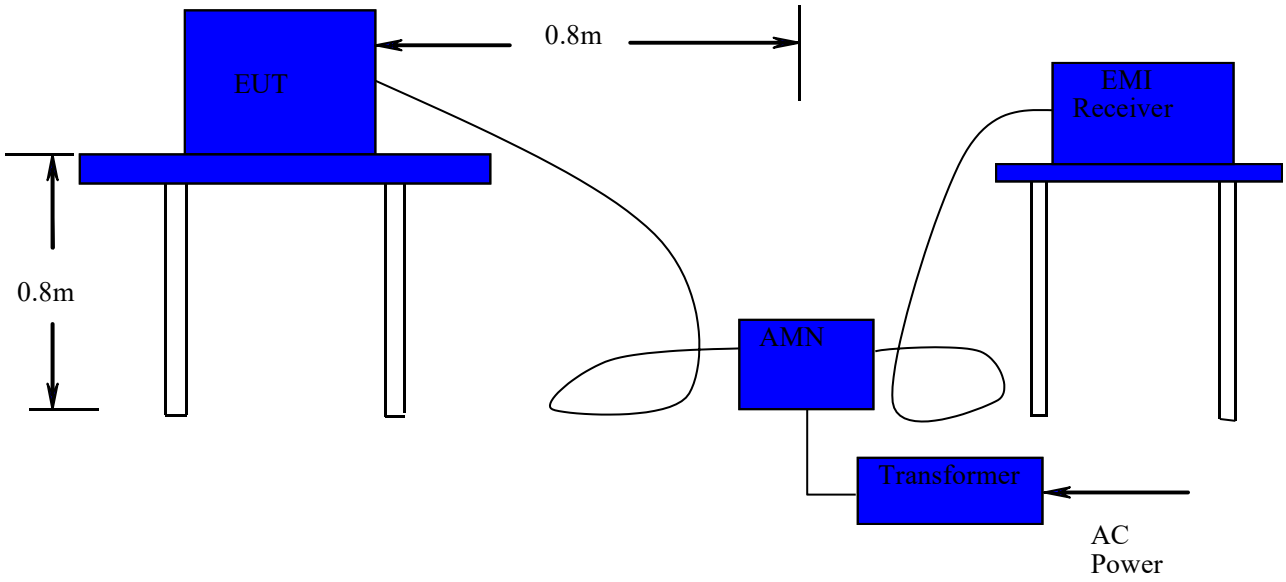
3.1.3 Limits of Continuous Disturbance Voltage at Mains Terminal.

Equipment type	Frequency range MHz	Limit values dBμV	
		Quasi-peak	Average
Household appliance	0.15 to 0.5	66-56 [a]	56- 46 [a]
	0.5 to 5	56	46
	5 to 30	60	50
[a] Decreasing linearly with logarithm of the frequency.			

Note: If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

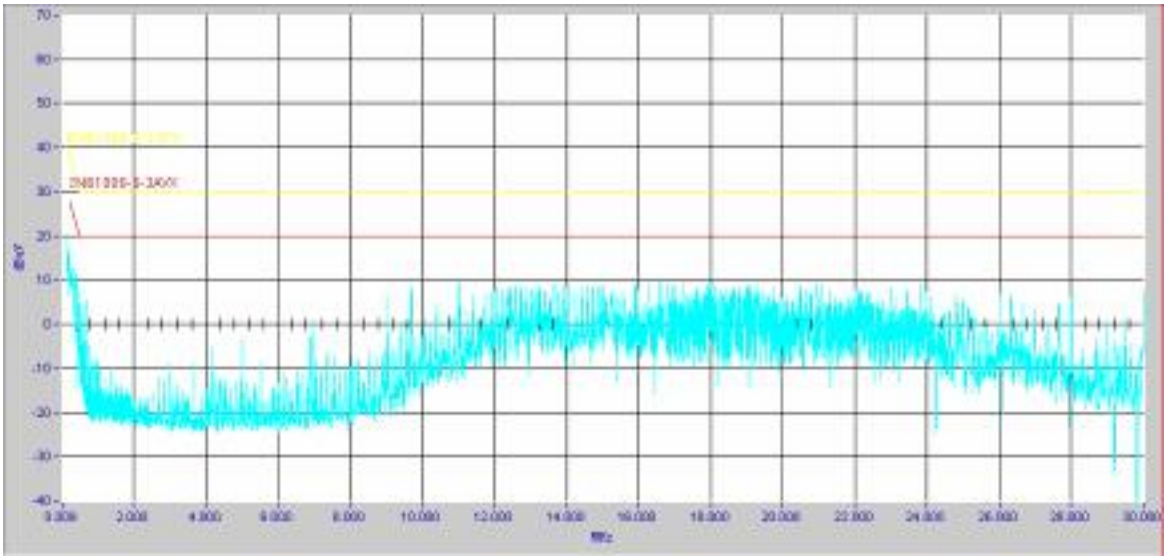
3.1.4 Configuration

The configuration is in accordance with the requirement in EN IEC 61000-6-3, the sketch map as follow:



3.1.5 Test Data and Records

Disturbance Voltage at the Mains Terminal TEST DATA			**EN IEC**
Frequency	Amplitude	Detector	Limit
MHz	dBμV	QP/Ave/Peak	dBμV
0.15-0.5	*	QP	66-56 Decreasing linearly with logarithm of the frequency
0.50-5	*	QP	56
5-30	*	QP	60
* Means the continuous disturbance voltage level 10dB lower than limits.			



3.1.6 Verdict

The EUT met the requirement.

3.2 Radiated disturbances

3.2.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
SCHAFFNER	Receive Antenna	CBL6112B	/	12/6/21	12/5/23
AFJ	EMI Receiver	ER55 CR/2.8	55790015165	6/23/21	6/22/23
Albatross Project	3Meter Anechoic Chamber		9290832	12/13/21	12/12/23
AFJ	16A LINE Impedance Stabilization Network	LS16C	16010020077	6/23/21	6/22/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

3.2.2 Description of Measurement Conditions

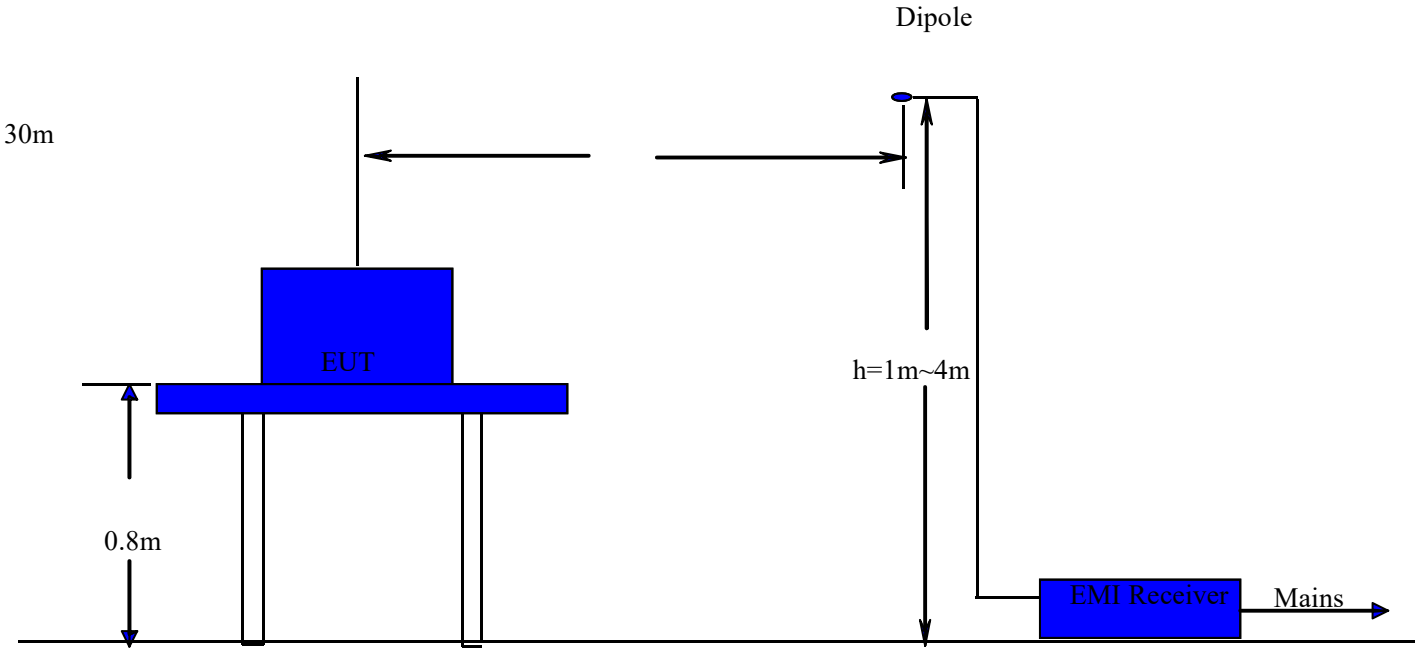
Temperature：20℃
Humidity: 60%
Pressure: 1033mbar
Electromagnetic environment: normal

3.2.3 Limits of radiated disturbances of class B ITE at a measuring distance of 10m.

Frequency range MHz	Quasi-peak limits(10m) dB(μV/m)
30 to 230	30
230 to 1000	37
NOTE: The lower limit shall apply at the transition frequency. NOTE: Additional provisions may be required for cases where interference occurs.	

3.2.4 Configuration

The configuration is in accordance with the requirement in EN IEC 61000-6-3, the sketch map as follow:

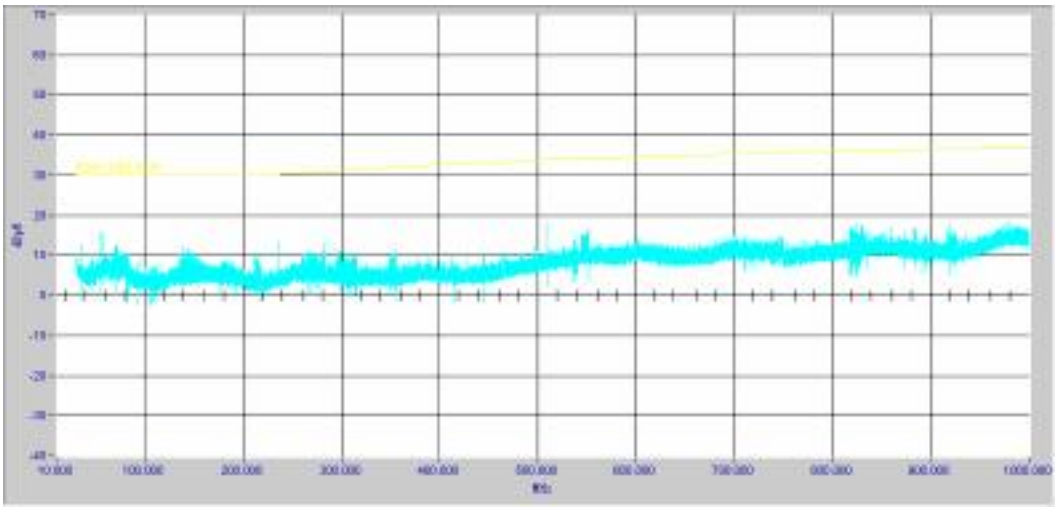


3.2.5 Test Data and Records

Radiated disturbances TEST DATA			EN IEC	
Frequency	**Amplitude**	**Detector**	**Limit(10m)**	**Margin**
MHz	dB(μV/m)	**Qp/Ave/Peak**	**dB(μV/m)**	**dB**
30 to 230	*	**QP**	30	
230 to 1000	*	**QP**	37	

NOTE: * Means the radiated disturbance level 10dB lower than limits

.



3.2.6 Verdict

The EUT met the requirement.

3.3 Discontinuous Disturbance Voltage at Mains Terminal (Click)

3.3.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
No.2 Radio factory of Changzhou	Screened Room	P-22	No	12/6/21	12/5/23
AFJ	CLICK Analyzer	CL-55C	55040019044	3/7/21	3/7/23
AFJ	16A LINE Impedance Stabilization Network	LS16C	16010020077	6/23/21	6/22/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

3.3.2 Description of Measurement Conditions

Temperature: 22℃
Humidity: 56%
Pressure: 1033mbar
Electromagnetic environment: normal

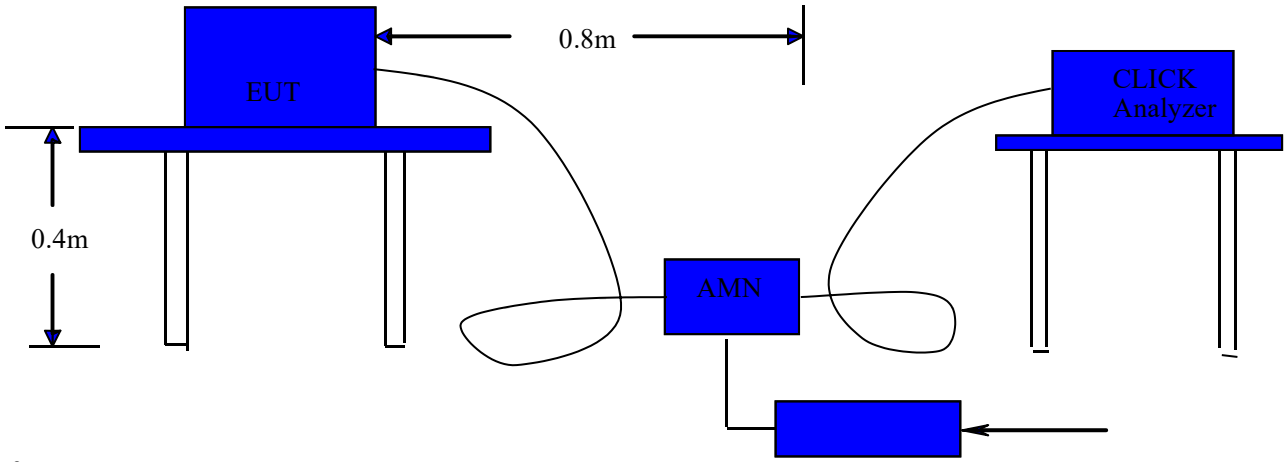
3.3.3 Limits of Click

For discontinuous disturbance, the click limit is attained by increasing the relevant limit of Continuous Disturbance Voltage with:

44dB for $N < 0.2$ or
20lg(30/N) dB for $0.2 \leq N < 30$

3.3.4 Configuration

The configuration in accordance with the requirement in EN IEC 61000-6-3, the sketch map as follow:



Transformer

3.3.5 Verdict

The EUT met the requirement.

EN IEC 61000-6-1

Description of Performance Criterion (According with EN IEC 61000-6-1 Section 4)

Performance Criterion A

The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacture, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance Criterion B

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however, no change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacture, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance Criterion C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

4.1 SURGES

4.1.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
Japan	Surge Lite	LSS-6030	9099E00350	10/14/21	10/13/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

4.1.2 Description of Measurement Conditions

Temperature: 21℃

Humidity: 58%

Pressure: 1033mbar

Electromagnetic environment: normal

4.1.3 Configuration

The configuration is in accordance with the requirement in EN61000-4-5.

4.1.4 Test Data and Records

Level	Voltage	Poll	Path	Pass	Fail
1	**1kV**	±	L-N	**B**	
2	**2kV**	±	L-PE, N-PE	**B**	
3					
4					

4.1.5 Verdict

The EUT was working as normal, so they met the requirement of performance criteria B.

4.2 ESD

4.2.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
Shanghai Sanki	Electrostatic Discharge tester	ESD-320	0329501C	6/23/21	6/22/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

4.2.2 Description of Measurement Conditions

Temperature: 21℃

Humidity: 58%

Pressure: 1033mbar

Electromagnetic environment: normal

4.2.3 Configuration

The configuration is in accordance with the requirement in EN61000-4-2.

4.2.4 Test Data and Records

Air Discharge

Test Levels																
EN61000-4-2 Test Points	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-10 kV	+10 kV	-12.5 kV	+12.5 kV	-15 kV	+15 kV	-20 kV	+20 kV
EUT Front Side	B	B	B	B	B	B	B	B								
EUT Top Side	B	B	B	B	B	B	B	B								
EUT Back Side	B	B	B	B	B	B	B	B								
EUT Left Side	B	B	B	B	B	B	B	B								
EUT Right Side	B	B	B	B	B	B	B	B								

Direct Contact

Test Levels																
EN61000-4-2 Test Points	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-10 kV	+10 kV	-12.5 kV	+12.5 kV	-15 kV	+15 kV	-20 kV	+20 kV
EUT Front Side	B	B	B	B												
EUT Top Side	B	B	B	B												
EUT Back Side	B	B	B	B												
EUT Left Side	B	B	B	B												
EUT Right Side	B	B	B	B												

4.2.5 Verdict

The EUT was working as normal, so they met the requirement of performance criteria B.

4.3 EFT/B

4.3.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
Shanghai Sanki	E.F.TB Generator	8014	069504E	6/23/21	6/22/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

4.3.2 Description of Measurement Conditions

Temperature: 21℃

Humidity: 58%

Pressure: 1033mbar

Electromagnetic environment: normal

4.3.3 Configuration

The configuration is in accordance with the requirement in EN61000-4-4.

4.3.4 Test Data and Records

Test Levels (kV)									
EN61000-4-4 Test Points		+0.25	-0.25	+0.5	-0.5	+1.0	-1.0	+2.0	-2.0
Power Port	L1	B	B	B	B				
	L2	B	B	B	B				
	L1+L2	B	B	B	B				
I/O Port		B	B	B	B				

4.3.5 Verdict

The EUT was working as normal, so they met the requirement of performance criteria B.

4.4 INJECTED CURRENTS

4.4.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
FLUKE	Synthesized RF Signal Generator	6061A	5080312	3/23/21	3/22/23
QF	Broadband Power Amplifier	QF3860	No	4/15/21	4/14/23
QF	Millivoltmeter	QF2281	92028	4/15/21	4/14/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

4.4.2 Description of Measurement Conditions

Temperature: 21℃

Humidity: 58%

Pressure: 1033mbar

Electromagnetic environment: normal

4.4.3 Configuration

The configuration in accordance with the requirement in EN 61000-4-6.

4.4.4 Test Data and Records

EN61000-4-6 Test Points	Frequency range MHz	Levels	Voltage Level (e.m.f.)V	Pass	Fail
Power Line	0.15-230MHz	1	1		
		2	3	A	
		3	10		
		X	Special		
I/O Line	0.15-230MHz	1	1		
		2	3	A	
		3	10		
		X	Special		

4.4.5 Verdict

The EUT was working as normal, so they met the requirement of performance criteria A.

4.5VOLTAGE DIPS AND INTERRUPTIONS

4.5.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
Japan	Voltage Dip Simulator	VDS-220B	2199D00098	10/22/21	10/21/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

4.5.2 Description of Measurement Conditions

Temperature: 21℃

Humidity: 58%

Pressure: 1033mbar

Electromagnetic environment: normal

4.5.3 Configuration

The configuration in accordance with the requirement in EN 61000-4-11.

4.5.4 Test Data and Records

Environmental phenomena		Test level in % U_T	Duration (in periods of the rated frequency)	Phase Angle	Pass	Fail
Interruptions		0	0.5T	0/180	**B**	
Voltage dips in % U_T	60	40	10T	0/180	**B**	
	30	70	50T	0/180	**B**	

4.5.5 Verdict

The EUT was working as normal, so they met the requirement of performance criteria B.

EN IEC 61000-3-2

1.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
EMC-PARTNER	Harmonics and Flicker Analyzer	HARMONIC S-1000	HAR1000-40	10/09/21	10/08/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

1.2 Description of Measurement Conditions

Temperature: 21℃
Humidity: 60%
Pressure: 1033mbar
Electromagnetic environment: normal

1.3 Configuration

The configuration is in accordance with the requirement in EN IEC 61000-3-2.

1.4 Test Data and Records

Order	Freq[Hz]	Iavg[A]	Iavg%L[%]	Imax[A]	Imax%L[%]	Limit[A]	Status
1	50	0.3129		0.4966			
2	100	0.0133	0.1241	0.0171	1.4563	1.0800	
3	150	0.0245	2.2358	0.0826	3.6303	2.3000	
4	200	0.0000	0.0051	0.0059	1.3626	0.4300	
5	250	0.0021	0.2193	0.0233	2.0399	1.1400	
6	300	0.0000	0.0000	0.0031	1.0376	0.3000	
7	350	0.0003	0.0549	0.0154	1.9975	0.7700	
8	400	0.0000	0.0000	0.0013	0.5838	0.2300	
9	450	0.0002	0.0499	0.0102	2.5482	0.4000	
10	500	0.0000	0.0000	0.0004	0.1990	0.1840	
11	550	0.0000	0.0091	0.0054	1.6276	0.3300	
12	600	0.0000	0.0000	0.0003	0.1990	0.1533	
13	650	0.0000	0.0000	0.0026	1.2498	0.2100	
14	700	0.0000	0.0000	0.0002	0.1858	0.1314	
15	750	0.0000	0.0000	0.0030	1.9938	0.1500	
16	800	0.0000	0.0000	0.0002	0.1592	0.1150	
17	850	0.0000	0.0000	0.0022	1.6602	0.1324	
18	900	0.0000	0.0000	0.0003	0.2985	0.1021	
19	950	0.0000	0.0000	0.0017	1.4431	0.1184	
20	1000	0.0000	0.0000	0.0002	0.2654	0.0920	
21	1050	0.0000	0.0000	0.0014	1.3102	0.1071	
22	1100	0.0000	0.0000	0.0001	0.1460	0.0836	
23	1150	0.0000	0.0000	0.0012	1.2478	0.0978	
24	1200	0.0000	0.0000	0.0001	0.0796	0.0767	
25	1250	0.0000	0.0000	0.0011	1.2207	0.0900	
26	1300	0.0000	0.0000	0.0001	0.0862	0.0708	
27	1350	0.0000	0.0000	0.0008	0.9521	0.0833	
28	1400	0.0000	0.0000	0.0001	0.1858	0.0657	
29	1450	0.0000	0.0000	0.0007	0.8653	0.0776	
30	1500	0.0000	0.0000	0.0001	0.0995	0.0613	
31	1550	0.0000	0.0000	0.0007	1.0091	0.0726	
32	1600	0.0000	0.0000	0.0001	0.2123	0.0575	
33	1650	0.0000	0.0000	0.0005	0.8057	0.0682	
34	1700	0.0000	0.0000	0.0001	0.2256	0.0541	
35	1750	0.0000	0.0000	0.0004	0.6646	0.0643	
36	1800	0.0000	0.0000	0.0001	0.1194	0.0511	
37	1850	0.0000	0.0000	0.0005	0.9033	0.0608	
38	1900	0.0000	0.0000	0.0001	0.1261	0.0484	
39	1950	0.0000	0.0000	0.0004	0.7406	0.0577	
40	2000	0.0000	0.0000	0.0001	0.1328	0.0460	
Result: Pass							

1.5 Verdict

The EUT met the requirement.

EN 61000-3-3

2.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
EMC-PARTNER	Harmonics and Flicker Analyzer	HARMONIC S-1000	HAR1000-40	10/09/21	10/08/23

Statement of Traceability: XMTEST certifies that all calibrations have been performed using suitable standards traceable to the CHINA SCEIENTIFIC MEASUREMENT INSTITUTE.

2.2 Description of Measurement Conditions

Temperature: 21℃
Humidity: 60%
Pressure: 1033mbar
Electromagnetic environment: normal

2.3 Configuration

The configuration is in accordance with the requirement in EN 61000-3-3.

2.4 Test Data and Records

Plt = 0.140				
	Pst	dmax	dc	dt>Lim
1	0.085	0.350	0.310	0.000
2	0.075	0.000	0.100	0.000
3	0.079	0.000	0.100	0.000
4	0.223	1.090	1.110	0.000
5	0.092	0.400	0.320	0.000
6	0.074	0.000	0.110	0.000
7	0.077	0.000	0.080	0.000
8	0.156	1.090	1.140	0.000
9	0.083	0.340	0.310	0.000
10	0.072	0.000	0.110	0.000
11	0.072	0.000	0.090	0.000
12	0.237	1.091	1.080	0.000
Result: Pass				

2.5 Verdict

The EUT met the requirement.

APPENDIX A— TEST PHOTOGRAPH





EC Declaration of conformity

Council Directive 2014/30/EU on Electromagnetic Compatibility

REVALCO ELECTRIC SPAIN, S.L.

Certify that the product described is in conformity with the Directive 2014/30/EU as amended

Product Name:
Residual Current Circuit Breaker

Item No:
RV31 Series
Un = 240V~(1P+N)415V~(3P+N)
In = 16, 25, 32, 40, 50, 63, 80, 100, 125A,
IΔn = 0.03A, 0.1A, 0.3A, 0.5A
type-AC, type-A, type-S, type-B

The product has been assessed by the application of the following standards:

EN IEC 61000-6-1:2019, EN IEC 61000-6-3:2021,
EN IEC 61000-3-2:2019+A1:2021, EN 61000-3-3:2013+A2:2021

Issue place and date

Company stamp and Signature of authorized personnel

REVALCO ELECTRIC SPAIN, S.L.

CE Technical Documents

Product Name: Residual Current Circuit Breaker

Applied Directive : Low Voltage Directive 2014/35/EU

Document No.: XMT0202200702S/LVD

Date: 2022.12.22

Revision: V0

Applicant	REVALCO ELECTRIC SPAIN, S.L.
Address	REVALCO ELECTRIC SPAIN, S.L.

Test Item Description	
Product Name :	Residual Current Circuit Breaker
Standard :	IEC 61008-1:2013+C1:2016, IEC 61008-2-1:1990, EN 61008-1:2012+A12:2017, EN 61008-2-1:1995
Model/Type Reference :	RV31 Series Un = 240V~(1P+N)415V~(3P+N) In = 16, 25, 32, 40, 50, 63, 80, 100, 125A, I△n = 0.03A, 0.1A, 0.3A, 0.5A type-AC, type-A, type-S, type-B

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

General Remarks

- This report shall not be reproduced except in full without the written approval of the testing laboratory.
- The test results presented in this report relate only to the item tested.
- Clause numbers between brackets refer to clauses in IEC 61008-1:2013+C1:2016, IEC 61008-2-1:1990, EN 61008-1:2012+A12:2017, EN 61008-2-1:1995.
- "(see remark #)"refers to a remark appended to the report.
- "(see Annex #)"refers to an annex appended to the report.
- Throughout this report a point is used as the decimal separator.

Copy of Marking Plate

CE

Product Name :

Residual Current Circuit Breaker

Model : RV31 AC240300, RV31 A480300

REVALCO ELECTRIC SPAIN, S.L.

IEC 61008-1:2013+C1:2016 / EN 61008-1:2012+A12:2017			
4.11	According to the type of terminals		-
8.1.3	Clearances and creepage distances (see Annex B)		-
	Replace the third paragraph of this subclause, and the modifications brought to it by Amendment 1, as follows: The clearances of items 2 and 4 (except accessible surface after installation, see Note 1) may be reduced provided that the measured clearances are not shorter than the minimum allowed in IEC 60664-1 for homogenous field conditions. Add the following new note after the third paragraph and renumber the existing notes of this subclause, introduced by Amendment 1, accordingly: NOTE 1 Accessible surface after installation means any surface accessible by the user when the RCD is installed according to the manufacturer's instructions. The test finger can be applied to determine whether a surface is accessible or not.	see Annex B	P
8.5	Operating characteristics		-
	Replace "9.9 and 9.21" by "9.9.1, 9.9.2, 9.9.3 and 9.9.4"		P
8.15	Terms and definitions		-
	Replace the second paragraph as follows: 61008-1 Amend. 2 © IEC:2013 Compliance is checked by the tests of 9.9.3.		P
	Table 9 – List of type tests In the table, delete the following item: – Behaviour of RCCBs in case of an earth fault current comprising a d.c. component 9.21		P
9.7.2	Insulation resistance of the main circuit		-
	Replace the existing text in item c) with the following text: c) with the RCCB in the closed position, between all poles connected together and the frame including a metal foil or part in contact with the outer surface of the housing of insulating material but with the terminal areas kept completely free to avoid flashover between terminals and the metal foil; Replace 9.9 and the modifications brought to it by Amendment 1 by the following:		P
9.9	Verification of the operating characteristics		-

9.9.1	Test circuit and test procedure		-
	The RCCB is installed as for normal use. The test circuit shall be of negligible inductance. For tests according to 9.9.2, the test circuit shall correspond to Figure 4. For tests according to 9.9.3, the test circuit shall correspond to Figure 5 or Figure 6, as applicable. The instruments for the measurement of the residual current shall display (or allow to determine) the true r.m.s. value. NOTE The information for instrument measurement is available at the following CTL webserver: <http://www.iecee.org/ctl/sheet/pdf/CTL%20DSH%20251B%20Beijing%202009_05_15.pdf> Unless otherwise specified, the tests are performed with no load at the reference temperature of 20 °C ± 5 °C. The RCCB shall perform the tests of 9.9.2, 9.9.3 and 9.9.4, as applicable. Each test is made on one pole only, taken at random, with five measurements, unless otherwise specified. For RCCBs having more than one rated frequency, the tests shall be carried out at the lowest and highest frequency, except for test in 9.9.2.5, where verification is performed at only one frequency. For RCCBs having multiple settings of residual operating current, the tests shall be made for each setting.		P
9.9.2	Tests for all RCCBs		-
9.9.2.1	Verification of correct operation in case of a steady increase of residual current		-
	The test switches S_1 and S_2 and the RCCB being in the closed position, the residual current is steadily increased, starting from a value not higher than 0,2 $I_{\Delta n}$, trying to attain the value of $I_{\Delta n}$ within 30 s, the tripping current being measured each time All five measured values shall be situated between $I_{\Delta n}$o and $I_{\Delta n}$.		P
9.9.2.2	Verification of correct operation on closing on a residual current		-
	The test circuit being calibrated at the rated value of the operating residual current IΔn and the test switches S_1 and S_2 being closed, the RCCB is closed on the circuit so as to simulate service conditions as closely as possible. The break time is measured five times. No measurement shall exceed the limiting value specified for $I_{\Delta n}$ in Table 1, according to the type		P

	of RCCB.		
9.9.2.3	Verification of correct operation in case of sudden appearance of sinusoidal a.c. residual current		-
	a) All types The test circuit being successively calibrated at each of the values of residual current specified in Table 1, the test switch S_2 and the RCCB being in the closed position, the test voltage is suddenly established by closing the test switch S_1. The RCCB shall trip during each test. Five measurements of the break time are made at each value of residual current. No value shall exceed the relevant specified limiting value given in Table 1.		P
	b) Additional test for type S The test circuit being successively calibrated at each of the values of residual current specified in Table 1, the test switch S_1 and the RCCB being in the closed position, the residual current is suddenly established by closing the test switch S_2 for periods corresponding to the relevant minimum non-actuating times, with a tolerance of $^{0}_{-5}$ %. Each application of residual current shall be separated from the previous one by an interval of at least 1 min. The RCCB shall not trip during any of the tests.		P
9.9.2.4	Verification of correct operation in case of sudden appearance of residual currents between 5 $I_{\Delta n}$ and 500 A		-
	The test circuit is calibrated at any two values of the residual current chosen at random within the range 5 A to 200 A, among the following list 5 A, 10 A, 20 A, 50 A, 100 A, 200 A. NOTE In Australia the measurement of the break time is made at 5 A, 10 A, 20 A, 50 A, 100 A, 200 A. The test switch S_1 and the RCCB being in the closed position, the residual current is suddenly established by closing the test switch S_2. The RCCB shall trip during each test. The break time shall not exceed the times given in Table 1. The test is made once for each value of the residual current with measurement of the break time.		P
9.9.2.5	Verification of correct operation with load		-
	The tests of 9.9.2.2 and 9.9.2.3 are repeated, the pole under test and one other pole of the RCCB being loaded		P

	with rated current, this current being established shortly before the test. For the test of 9.9.2.3, the switch S_1 and RCCB are in closed position. The residual current is established by closing S_2.		
9.9.2.6	Tests at the temperature limits		-
	The RCCB shall perform the tests specified in 9.9.2.3 under the following conditions,successively:		P
	a)ambient temperature: –5 °C, off-load;		P
	b)ambient temperature: +40 °C, the RCCB having been previously loaded with the rated current, at any convenient voltage, until it attains thermal steady-state conditions. In practice these conditions are reached when the variation of temperature-rise does not exceed 1 K per hour.		P
	For the tripping tests in b), the flow of rated current may be interrupted, provided that the total interruption period does not exceed 30 s. As soon as the sum of interruption periods exceed 30 s, the RCCB shall be loaded again with rated current for 5 min before next tripping time measurement. NOTE Preheating may be carried out at any convenient voltage at either 50 Hz or 60 Hz but auxiliary circuits shall be connected to their normal operating voltage (particularly for components depending on line voltage).		P
9.9.3	Additional verification of correct operation at residual currents with d.c. components for type A RCCBs		-
9.9.3.1	Verification of correct operation in case of a continuous rise of residual pulsating direct current		-
	The test shall be performed according to Figure 5. The auxiliary switches S_1 and S_2 and the RCCB shall be closed. The relevant thyristor shall be controlled in such a manner that current delay angles α of 0°, 90° and 135° are obtained. Each pole of the RCCB shall be tested twice at each of the current delay angles, in position I as well as in position II of the auxiliary switch S_3. For each test, the current shall be steadily increased at an approximate rate of 1,4 $I_{\Delta n}$/30 amperes per second for RCCBs with $I_{\Delta n}$ > 0,01 A, and at an approximate rate of 2 $I_{\Delta n}$/30 amperes per second for RCCBs with $I_{\Delta n}$ ≤ 0,01 A, starting from zero. The tripping current shall be in accordance with Table 20.		P
9.9.3.2	Verification of correct operation in case of suddenly		-

	appearing residual pulsating direct currents		
	The RCCB shall be tested according to Figure 5. The circuit being successively calibrated at the values specified hereafter and the auxiliary switch S_1 and the RCCB being in the closed position, the residual current is suddenly established by closing the switch S_2. The test is carried out at each value of residual current specified in Table 2, according to the type of RCCB. Two measurements of the break time are made at each value of residual current, at a current delay angle α = 0° with the auxiliary switch S_3 in position I for the first measurement and in position II for the second measurement. No value shall exceed the specified limiting values.		P
9.9.3.3	Verification of correct operation with load		-
	The tests of 9.9.3.1 are repeated, the pole under test and one other pole of the RCCB being loaded with the rated current, this current being established shortly before the test. NOTE The loading with rated current is not shown in Figure 5.		P
9.9.3.4	Verification of correct operation in case of residual pulsating direct currents superimposed by a smooth direct current of 0,006 A		-
	The RCCB shall be tested according to Figure 6 with a half-wave rectified residual current (current delay angle α = 0°) superimposed by a smooth direct current of 0,006 A. Each pole of the RCCB is tested in turn, twice at each of positions I and II. The half-wave current I_1, starting from zero, being steadily increased at an approximate rate of 1,4 $I_{\Delta n}$ /30 amperes per second for RCCBs with $I_{\Delta n}$ > 0,01 A and 2 $I_{\Delta n}$ /30 amperes per second for RCCBs with $I_{\Delta n}$ ≤ 0,01 A, the device shall trip before this half-wave current I_1 reaches a value not exceeding 1,4 $I_{\Delta n}$ or 2 $I_{\Delta n}$ respectively.		P
9.9.4	Particular test conditions for RCCBs functionally dependent on line voltage		-
	For RCCBs functionally dependent on line voltage, each test is made at the following values of the line voltage, applied to the relevant terminals: 1,1 and 0,85 times the rated line voltage.		P
9.21	Verification of correct operation of residual currents with d.c. components		-
	Replace the title and text of this subclause by “Void”.		P

	Replace 9.24 by the following:		
9.24	Electromagnetic compatibility (EMC)		-
9.24.1	Tests covered by the present standard		-
	Tests listed in Table 21 are covered by the present standard and need not be repeated.	See Table 21	P
9.24.2	Additional tests		-
	Tests listed in Table 23 shall be carried out according to test sequences H, I and J listed in Annex A of the present standard. 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 IEC 61543.	See Table 23	P
4.11	Suivant le type de bornes		
8.1.3	Distances d'isolement dans l'air et lignes de fuite (voir Annexe B)		-
	Remplacer le troisième alinéa de ce paragraphe, et les modifications introduites par l'Amendement 1, comme suit: Les distances d'isolement des points 2 et 4 (à l'exception des surfaces accessibles après l'installation, voir Note 1) peuvent être réduites à condition que les distances d'isolement mesurées ne soient pas plus courtes que le minimum autorisé dans la CEI 60664-1 pour les conditions de champs homogènes. Ajouter la nouvelle note suivante après le troisième alinéa et renuméroter les notes existantes dans ce paragraphe, introduites par l'Amendement 1, en conséquence: NOTE 1 Les surfaces accessibles après l'installation désignent toutes les surfaces accessibles par l'utilisateur lorsque l'ID est installé conformément aux instructions du fabricant. Le doigt d'épreuve peut être appliqué pour déterminer si la surface est accessible ou non.		P
8.5	Caractéristiques de fonctionnement		-
	Remplacer "9.9 et 9.21" par "9.9.1, 9.9.2, 9.9.3 et 9.9.4"		P
8.15	Comportement de l'ID en cas de courant de défaut à la terre comprenant une composante continue		-
	Remplacer le deuxième paragraphe comme suit: La conformité est vérifiée par les essais de 9.9.3. Tableau 9 – Liste des essais de type Dans le tableau, supprimer le point suivant: – Comportement des ID en cas de courant de défaut à la terre comprenant une composante continue 9.21		P
9.7.2	Résistance d'isolement du circuit principal		-

	Remplacer le texte dans le point c) par le texte qui suit: c) l'ID étant en position de fermeture, entre toutes les bornes reliées entre elles et la masse, y compris une feuille métallique ou une partie en contact avec la surface extérieure de l'enveloppe du matériau isolant mais avec les zones des bornes laissées complètement libres pour éviter la production d'amorçage entre les bornes et la feuille métallique; Remplacer 9.9 et les modifications introduites par l'Amendement 1 par ce qui suit:		P
9.9	Vérification des caractéristiques de fonctionnement		-
9.9.1	Circuit d'essai et modalités de l'essai		-
	L'ID est installé comme en usage normal. Le circuit d'essai doit avoir une inductance négligeable Pour les essais conformément au 9.9.2, le circuit d'essai doit correspondre à la Figure 4. Pour les essais conformément au 9.9.3, le circuit d'essai doit correspondre à la Figure 5 ou 6, le cas échéant. Les appareils pour la mesure du courant différentiel doivent afficher (ou permettre de déterminer) la vraie valeur efficace. NOTE L'information sur l'instrument de mesure est disponible à l'adresse internet suivante (en anglais): <http://www.iecee.org/ctl/sheet/pdf/CTL%20DSH%2025 1B%20Beijing%202009_05_15.pdf> Sauf spécification contraire, les essais sont effectués à vide à une température de référence de 20 °C ± 5 °C. L'ID doit être soumis aux essais 9.9.2, 9.9.3 et 9.9.4, le cas échéant. Chaque essai est effectué sur un seul pôle pris au hasard, avec cinq mesures, sauf indications contraires. Pour les ID ayant plus d'une fréquence assignée, les essais doivent être effectués à la fréquence la plus basse et à la fréquence la plus élevée, exception faite pour l'essai du 9.9.2.5 où la vérification est faite à une seule fréquence. Pour les ID ayant plusieurs réglages de courant différentiel les essais doivent être faits pour chaque réglage.		P
9.9.2	Essais pour tous les ID		-
	Les conditions d'essais conformes au 9.9.1 s'appliquent à tous les ID.		P
9.9.2.1	Vérification du fonctionnement correct en cas de croissance régulière du courant différentiel		-
	Les interrupteurs d'essais S_1 et S_2 et l'ID en essai étant fermés on fait croître		P

	progressivement le courant différentiel, à partir d'une valeur au plus égale à 0,2 $I_{\Delta n}$ jusqu'à essayer d'atteindre $I_{\Delta n}$ en moins de 30 s, le courant de déclenchement étant mesuré chaque fois. Les cinq valeurs mesurées doivent être comprises entre $I_{\Delta no}$ et $I_{\Delta n}$.		
9.9.2.2	Vérification du fonctionnement correct en cas de fermeture sur courant différentiel		-
	Le circuit d'essai étant étalonné pour la valeur assignée du courant différentiel de fonctionnement IΔn et les interrupteurs d'essais S1 et S2 étant préalablement fermés, on établit le courant en fermant l'ID de façon à reproduire aussi fidèlement que possible les conditions de service. Cinq mesures du temps de fonctionnement sont effectuées. Aucune mesure ne doit dépasser la valeur limite spécifiée pour IΔn au Tableau 1, selon le type d'ID.		P
9.9.2.3	Vérification du fonctionnement correct en cas d'apparition soudaine de courant alternatif sinusoïdal courant différentiel résiduel		-
	a) Tous types Le circuit d'essai étant successivement étalonné à haque valeur du courant résiduel spécifiée au Tableau 1, l'interrupteur d'essai S_2 et l'ID étant en position fermée, la tension d'essai est établie brusquement en fermant l'interrupteur d'essai S_1. L'ID doit déclencher à chaque essai. Cinq mesures du temps de fonctionnement sont effectuées à chaque valeur du courant résiduel. Aucune de ces valeurs ne doit dépasser les valeurs limites spécifiées dans le Tableau 1.		P
	b) Essai supplémentaire pour le type S Le circuit d'essai étant successivement étalonné aux valeurs de courant résiduel spécifiées au Tableau 1, l'interrupteur d'essai S1 et l'ID étant en position fermée, le courant différentiel est établi brusquement en fermant l'interrupteur d'essai S2 pendant des périodes correspondant aux temps de non-réponse minimaux applicables, avec une tolérance de $^{0}_{-5}$ %. Chaque application du courant résiduel doit être séparée de la précédente par un intervalle de temps d'au moins 1 min. L'ID ne doit pas déclencher pendant l'un quelconque des essais.		P
9.9.2.4	Vérification du fonctionnement correct en cas d'apparition soudaine de courants résiduels pour des valeurs comprises entre 5 IΔn et 500 A		-

	Le circuit d'essai est calibré aux deux valeurs onvenables du courant résiduel sélectionné au hasard entre 5 A et 200 A, parmi le suivante 5 A, 10 A, 20 A, 50 A, 100 A, 200 A. NOTE En Australie la mesure du temps de onctionnement est faite à 5 A, 10 A, 20 A, 50 A, 100 A, 200 A. Le courant résiduel est établi par fermeture soudaine de l'interrupteur d'essai S_2,l'interrupteur S_1 et l'ID étant fermés. L'ID doit déclencher à chaque essai. Le temps de fonctionnement ne doit pas être supérieur aux valeurs indiquées au Tableau 1. L'essai est réalisé une fois pour chaque valeur du courant résiduel, le temps de fonctionnement étant mesuré à chaque essai.		P
9.9.2.5	Vérification du fonctionnement correct, en charge		-
	Les essais des 9.9.2.2 et 9.9.2.3 sont répétés, le pole sous test et un autre pole de l'ID étant chargé à son courant assigné, la courant étant établi brièvement avant le test		P
	Pour les essais du 9.9.2.3, l'interrupteur S_1 et l'ID sont en position fermée. Le courant différentiel est établi en fermant S_2.		P
9.9.2.6	Essais aux températures limites		-
	L'ID doit satisfaire aux essais du 9.9.2.3 successivement dans les conditions suivantes: a) température ambiante: –5 °C, à vide;		P
	b) température ambiante: +40 °C, l'appareil étant préalablement chargé au courant assigné, sous une tension convenable, jusqu'à l'obtention de l'équilibre thermique. En pratique, ces conditions sont atteintes quand l'échauffement ne varie pas de plus de 1 K par heure.		P
	Pour les essais de déclenchement décrit en b), le débit du courant assigné peut être interrompu, à condition que la période totale d'interruption ne dépasse pas les 30 s. Dès que le total des périodes d'interruption atteint 30 s, l'ID doit être de nouveau chargé au courant assigné pendant 5 min avant la prochaine mesure du temps de déclenchement. NOTE Le préchauffage peut être fait à tension réduite, à 50 Hz ou 60 Hz, mais les circuits auxiliaires doivent être alimentés à leur tension normale d'emploi (en particulier pour les composants dépendants de la tension d'alimentation).		P

9.9.3	Vérification du fonctionnement correct des courants différentiels avec composante continue		-
9.9.3.1	Vérification du fonctionnement correct dans le cas d'un accroissement continu du courant différentiel continu pulsé		-
	Les essais doivent être effectués en accord avec la Figure 5. Les interrupteurs auxiliaires S_1 et S_2 et l'ID doivent être fermés. Le thyristor approprié doit être commandé de telle façon que l'on puisse obtenir des angles de retard du courant α de 0°, 90° et 135°. Chaque pôle de l'ID doit être essayé deux fois pour chacun des angles de retard du courant pour la position I aussi bien que la position II de l'interrupteur auxiliaire S_3. A chaque essai le courant doit être augmenté de façon continue en partant de zéro avec un taux d'accroissement approximativement de 1,4 $I_{\Delta n}$/30 ampères par seconde pour les ID dont $I_{\Delta n}$ est supérieur à 0,01 A et avec un taux d'accroissement de 2 $I_{\Delta n}$/30 ampères par seconde pour les ID dont $I_{\Delta n}$ est inférieur ou égal à 0,01 A, à partir de zéro. Le courant de déclenchement doit être conforme aux valeurs du Tableau 20.		P
9.9.3.2	Vérification du fonctionnement correct dans le cas d'apparition soudaine de courants différentiels continus pulsés		-
	Les ID doivent être essayés selon la Figure 5. Le circuit étant étalonné successivement aux valeurs spécifiées ci-après, l'interrupteur auxiliaire S_1 et l'ID étant en position fermée, le courant différentiel est brusquement établi en fermant l'interrupteur S_2.		P
	L'essai est effectué à chaque valeur du courant différentiel spécifié au Tableau 2, en accord avec le type d'ID. Deux mesures du temps de fonctionnement sont effectuées pour chaque valeur du courant résiduel avec un angle de retard α = 0°, l'interrupteur auxiliaire S3 étant en position I pour la première mesure et en position II pour la seconde mesure. Aucune mesure ne doit dépasser les valeurs limites spécifiées.		P
9.9.3.3	Vérification du fonctionnement correct, en charge		-
	Les essais de 9.9.3.1 sont répétés, le pôle en essai et un autre pôle de l'ID étant chargés au courant assigné, ce courant étant établi peu de temps avant l'essai. NOTE La mise en charge sous le courant assigné n'est pas indiquée à la Figure 5		P

9.9.3.4	Vérification du fonctionnement correct dans le cas de courant résiduel continu pulsé auquel est superposé un courant continu lissé de 0,006 A		-
	L'ID doit être essayé en accord avec la Figure 6 avec un courant de défaut redressé d'une demi-onde (angle de retard α = 0°) auquel est superposé un courant continu lissé de 0,006 A. Chaque pôle de l'ID est essayé deux fois successivement dans chacune des positions I et II. Le courant I1 d'une demi-onde étant augmenté de façon continue en partant de zéro avec un taux d'accroissement approximativement de 1,4 $I_{\Delta n}$ /30 ampères par seconde pour les ID dont $I_{\Delta n}$ > 0,01 A et 2 $I_{\Delta n}$ /30 ampères par seconde pour les ID dont $I_{\Delta n}$ ≤ 0,01 A le dispositif doit déclencher avant que ce courant I1 d'une demi-onde atteigne une valeur maximale de 1,4 $I_{\Delta n}$ ou 2 $I_{\Delta n}$ respectivement.		P
9.9.4	Conditions d'essais particulières pour ID fonctionnellement dépendants de la tension d'alimentation		-
	Pour les ID fonctionnellement dépendants de la tension d'alimentation, chaque essai est effectué aux valeurs suivantes de la tension d'alimentation, appliquée aux bornes correspondantes: 1,1 et 0,85 fois la valeur assignée de la tension d'alimentation		P
9.21	Vérification du fonctionnement correct des courants différentiels avec composante continue		-
	Remplacer le titre et le texte de ce paragraphe par "Vide". Remplacer 9.24 par ce qui suit:		P
9.24	Compatibilité électromagnétique (CEM)		-
9.24.1	Essais couverts par la présente norme		-
	Les essais listés dans le Tableau 21_b sont couverts par la présente norme et n'ont pas besoin d'être répétés.	See Tableau 21_b	
9.24.2	Essais complémentaires		-
	Les essais listés dans les Tableau 23_b doit être effectué selon les séquences d'essais H, I et J énumérés dans l'Annexe A de cette norme. Pour les dispositifs incorporant un oscillateur permanent, l'essai du CISPR 14-1 doit être effectué sur les échantillons avant les essais de la CEI 61543.	See Tableau 23_b	P

IEC 61008-2-1:1990
Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCB's)
Part 2-1 : Applicability of the general rules to RCCB's functionally independent of line voltage

1.	Scope		
	Replace the first paragraph by the following: This International Standard applies to RCCB's functionally independent of line voltage, for household and similar uses, not incorporating overcurrent protection, for rated voltages not exceeding 440 V a.c. and rated currents not exceeding 125 A, intended principally for protection against electric shock hazard.		P
2	Normative references		
	This clause of Part 1 is applicable.		P
3	Definitions		
	This clause of Part 1 is applicable except that definitions 3.3.5, 3.4.10, 3.4.10.1 and 3.4.10.2 do not apply.		P
4	Classification		
	This clause of Part 1 is applicable except that 4.1.2 does not apply.		P
5	Characteristics of RCCB's		
	This clause of Part 1 is applicable except that the last two lines of 5.1 do not apply.		P
6	Marking and other product information		
	This clause of Part 1 is applicable except that letter n) does not apply.		P
7	Conditions normales de fonctionnement en service et d'installations		
	L'article de la partie 1 est applicable.		P
8	Prescriptions de fonctionnement		
	L'article de la partie 1 est applicable à l'exception du 8.12.		P
9	Essais		
	L'article de la partie 1 est applicable à l'exception de ce qui suit:		P
	Le 15ème t i r e t (relatif à l'essai du 9.17) du tableau 7 de 9.1.1 n'est pas appl kable.		P

	La note 3 du 9.7.4 n'est pas applicable.		P
	Le 9.9.5 n'est pas applicable.		P
	Les deux derniers alinéas du point a) et le dernier alinéa du point i) du 9.11.2.1 ne sont pas applicables.		P
	Le 9.17 n'est pas applicable.		P
	Le dernier alinéa de 9.18.1 et de 9.18.2 ne sont pas applicables.		P
	Les figures de la partie 1 sont applicables		P

EN 61008-2-1:1995
Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCB's) — Part 2-1: Applicability of the general rules to RCCB's functionally independent of line voltage

1	Scope		
	This clause of Part 1 is applicable, except as follows: Replace the first paragraph by the following: This International Standard applies to RCCB's functionally independent of line voltage, for household and similar uses, not incorporating overcurrent protection, for rated voltages not exceeding 440 V a.c. and rated currents not exceeding 125 A, intended principally for protection against electric shock hazard.		P
2	Normative references		
	This clause of Part 1 is applicable.		P
3	Definitions		
	This clause of Part 1 is applicable except that definitions 3.3.5, 3.4.10, 3.4.10.1 and 3.4.10.2 do not apply.		P
4	Classification		
	This clause of Part 1 is applicable except that 4.1.2 does not apply.		P
5	Characteristics of RCCB's		
	This clause of Part 1 is applicable except that the last two lines of 5.1 do not apply.		P
6	Marking and other product information		
	This clause of Part 1 is applicable except that letter n) does not apply.		P
7	Standard conditions for operation in service and for installation		
	This clause of Part 1 is applicable.		P
8	Requirements for construction and operation		
	This clause of Part 1 is applicable except that 8.12 does not apply.		P
9	Tests		
	This clause of Part 1 is applicable except as follows.		P

	In Table 7 of 9.1.1 the 15th dashed text (referred to the test of 9.17) does not apply.		
	Note 3 of 9.7.4 does not apply.		P
9.9.5	does not apply.		P
	The last two paragraphs of letter a) and the last paragraph of letter i) of 9.11.2.1 do not apply. 9.17 does not apply.		P
	The last paragraphs of 9.18.1 and of 9.18.2 do not apply.		P
9.23	Add after the 1st paragraph:		P
	In case there are no electronic components connected between phase poles and/or between phase poles and the neutral pole, the RCCB is loaded with rated current at any convenient voltage.		P

APPENDIX A— TEST PHOTOGRAPH





EC Declaration of conformity

Council Directive 2014/35/EU on Low Voltage Detector

REVALCO ELECTRIC SPAIN, S.L.

Certify that the product described is in conformity with the
Low Voltage Directive 2014/35/EU as amended

Product Name:

Residual Current Circuit Breaker

Item No:

RV31 Series
Un = 240V~(1P+N)415V~(3P+N)
In = 16, 25, 32, 40, 50, 63, 80, 100, 125A,
I Δ n = 0.03A, 0.1A, 0.3A, 0.5A
type-AC, type-A, type-S, type-B

The product has been assessed by the application of the following standards:

IEC 61008-1:2013+C1:2016, IEC 61008-2-1:1990,
EN 61008-1:2012+A12:2017, EN 61008-2-1:1995

Issue place and date	Company stamp and Signature of authorized personnel

Certificate – Сертификат – 證明書 – Certificat – 증명서 – شهادة

CERTIFICATE

No. 0H221223.RESSQ51

Test Report / Technical Construction File no. XMT0202200690S/LVD, XMT0202200691S/EMC

Certificate's Holder: REVALCO ELECTRIC SPAIN, S.L.

Certification ECM Mark: Type Approved

Product: Miniature Circuit Breaker

Model(s): *(see the following annex)*

Verification to: Standard:
IEC 60898-1:2019+C1:2020, IEC 60947-2:2019,
EN IEC 61000-6-1:2019, EN IEC 61000-6-3:2021,
EN IEC 61000-3-2:2019+A1:2021,
EN 61000-3-3:2013+A2:2021

related to CE Directive(s):
2014/35/EU (Low Voltage)
2014/30/EU (Electromagnetic Compatibility)

This document has been issued in accordance with the European Commission's note of 14 September 2022 ref. Ares (2022) 6342894 concerning voluntary certifications with a non-notified procedure.

The manufacturer has voluntarily decided to submit its documents concerning the above-mentioned product for verification. Ente Certificazione Macchine confirms that the documentation made available and immediately returned to it, as containing sensitive data, meets the essential requirements of the above-mentioned directives. The verification activity carried out exclusively concerned the technical documentation and no verification was carried out on the product. This document cannot replace the EC Declaration of Conformity. The above conformity mark can be affixed to the technical documentation in accordance with the ECM regulation on its issue and use, published on the website www.entecerma.it

Issuance date: 23 December 2022

Expiry date: 22 December 2027

For online check:

Approver
Ente Certificazione Macchine
Legal Representative
Luca Bedonni

Ente Certificazione Macchine Srl
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Certificate – Сертификат – 證明書 – Certificat – 증명서 – شهادة

Annex I

No. 0H221223.RESSQ51

Test Report / Technical Construction File no. XMT0202200690S/LVD, XMT0202200691S/EMC

Model(s):

RV30 Basic model Series and RV30 Normal Model Series
Ue=240/415V~(1P),240V~(1P+N),415V~(2P,3P,3P+N,4P)
In=1, 2, 3, 4, 6, 10, 16, 20, 25, 32, 40, 50, 63A B-, C- and D- Type
IEC 60898-1:Ics=Icn=6000A,Energy limiting class 3(Only for B,C type)
IEC 60947-2:Icn=10000A, Ics=7500A,Energy limiting class 3(Only for B,C type)

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Certificate – Сертификат – 證明書 – Certificat – 증명서 – شهادة

CERTIFICATE

No. 0H221223.RESSQ57

Test Report / Technical Construction File no. XMT0202200702S/LVD, XMT0202200703S/EMC

Certificate's Holder: REVALCO ELECTRIC SPAIN, S.L.

Certification ECM Mark: Type Approved

Product: Residual Current Circuit Breaker

Model(s): *(see the following annex)*

Verification to: Standard:
IEC 61008-1:2013+C1:2016, IEC 61008-2-1:1990,
EN 61008-1:2012+A12:2017, EN 61008-2-1:1995,
EN IEC 61000-6-1:2019, EN IEC 61000-6-3:2021,
EN IEC 61000-3-2:2019+A1:2021,
EN 61000-3-3:2013+A2:2021

related to CE Directive(s):
2014/35/EU (Low Voltage)
2014/30/EU (Electromagnetic Compatibility)

This document has been issued in accordance with the European Commission's note of 14 September 2022 ref. Ares (2022) 6342894 concerning voluntary certifications with a non-notified procedure.

The manufacturer has voluntarily decided to submit its documents concerning the above-mentioned product for verification. Ente Certificazione Macchine confirms that the documentation made available and immediately returned to it, as containing sensitive data, meets the essential requirements of the above-mentioned directives. The verification activity carried out exclusively concerned the technical documentation and no verification was carried out on the product. This document cannot replace the EC Declaration of Conformity. The above conformity mark can be affixed to the technical documentation in accordance with the ECM regulation on its issue and use, published on the website www.entecerma.it

Issuance date: 23 December 2022

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Certificate – Сертификат – 證明書 – Certificat – 증명서 – شهادة

Annex I

No. 0H221223.RESSQ57

Test Report / Technical Construction File no. XMT0202200702S/LVD, XMT0202200703S/EMC

Model(s):

RV31 Series
Un = 240V~(1P+N)415V~(3P+N)
In = 16, 25, 32, 40, 50, 63, 80, 100, 125A,
IΔn = 0.03A, 0.1A, 0.3A, 0.5A
type-AC, type-A, type-S, type-B

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Interruptores automáticos RV30- 6KA









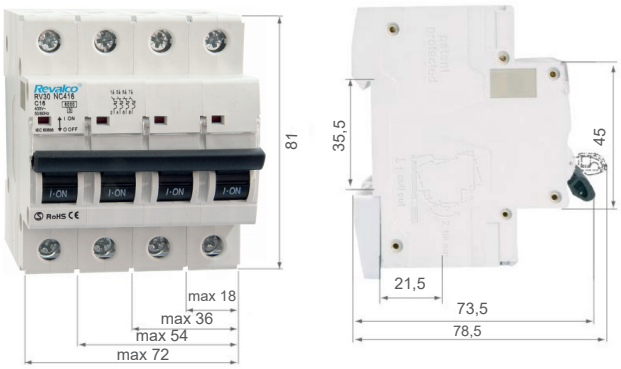
Construcción y características

- El diseño de vanguardia.
- Aspecto elegante, la cubierta y la manija en forma de arco hacen que la operación sea cómoda.
- Ventana indicadora de posición de contacto.
- Cubierta transparente diseñada para llevar etiqueta.
- La manija se mantiene en la posición central para indicar el fallo del circuito en caso de sobrecarga, al circuito protegido, la manija MCB se dispara y permanece en la posición central, lo que permite una solución rápida a la línea defectuosa. La manija no puede permanecer en tal posición cuando se opera manualmente.
- Alta capacidad de cortocircuito.
- Larga resistencia eléctrica de hasta 6000 ciclos gracias al mecanismo de fabricación rápido.
- Dispositivo de candado del asa MCB se puede bloquear en la posición “ON” o en la posición “OFF” para evitar el funcionamiento no deseado del producto.
- Dispositivo de bloqueo del terminal de tornillo.
- El dispositivo de bloqueo evita el desmontaje accidental o no deseado de los terminales conectados.

Datos técnicos

- Modelo: RV30
- Normativa internacional IEC60898
- Poder de corte: 6kA
- Nº de polos: 1P, 1P+N, 2P, 3P 4P
- Corriente nominal (A): 1, 2, 3, 4, 5, 6, 10, 16, 20, 25, 32, 40, 50, 63
- Voltaje de funcionamiento clasificado: 240V/415V AC
- Frecuencia nominal: 50/60Hz
- Curvas: B, C y D
- Alto cortocircuito que rompe capacidad: 6000A (6kA)
- Alta capacidad de corte en cortocircuito (Icn): 10kA Capacidad de corte en circuito nominal (Ics): 7,5 kA
- Resistencia electromecánica: 20000
- Modo de cableado: cableado frontal
- Indicación de posición de contacto
- Capacidad de conexión: conductor rígido de hasta 25mm^2
- Terminal altura de conexión: 19mm
- Par de apriete: 2,0 Nm
- Instalación: en riel DIN simétrico de 3 5mm
- Permite empleo de peines de conexión tipo pin
- Amplia gama de accesorios

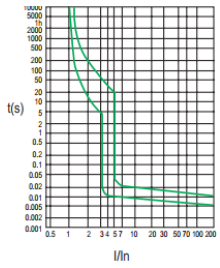
Dimensiones generales y de instalación



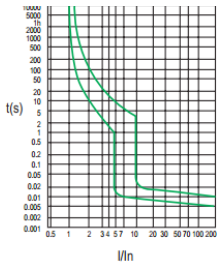
CB CE RoHS

Interruptores automáticos RV30- 6KA

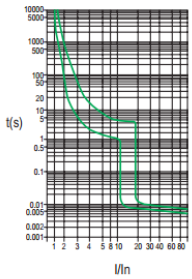
Curva característica



Curva B



Curva C

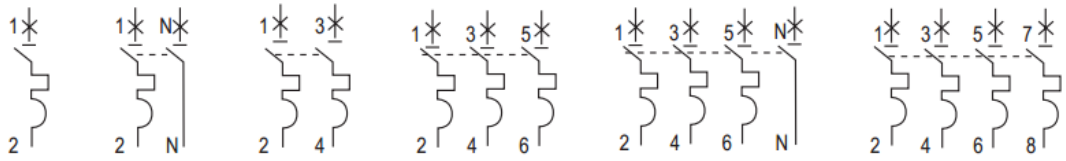


Curva D

Consumo de energía

Rango de corriente nominal (InA)	Consumo máximo (W)
In≤ 10	3
10< In≤16	3,5
16< In≤25	4,5
25< In≤32	6
32< In≤40	7,5
40< In≤50	9
50< In≤63	13

Diagrama de cableado



Características de protección de sobrecarga de corriente

Procedimineto de prueba	Tipo	Corriente de prueba	Estado inicial	Tiempo límite de disparo	Resultado esperado	Observación
A	B, C, D	1.13In	frío	t ≤ 1h	sin disparos	
B	B, C, D	1.45In	después de pruebas	t < 1h	con disparos	Corriente en los 5s aumento de la estabilidad
C	B, C, D	2.55In	frío	1s < t < 60s(In≤32A) 1s< t < 120s(In >32A)	con disparos	
D	B	3In	frío	t ≥ 0.1s	sin disparos	Encienda el interruptor auxiliar para cerrar la corriente
	C	5In				
	D	10In				
E	B	5In	frío	t < 0.1s	con disparos	Encienda el interruptor auxiliar para cerrar la corriente
	C	10In				
	D	20In				

Interruptores diferenciales RV31- E



Construcción y características

- Aspecto elegante, la cubierta y la manija en forma de arco facilitan la operación.
- Ventana indicadora de posición de contacto.
- Funda transparente diseñada para llevar etiqueta
- En caso de sobrecarga, al circuito protegido, el asa del interruptor se dispara y permanece en la posición central, lo que permite una solución rápida a la línea defectuosa. La manija no puede permanecer en tal posición cuando se opera manualmente.
- Proporciona protección contra fallo a la línea defectuosa. El campo no puede permanecer en tal posición cuando se opera manualmente.
- Proporciona protección contra fallo a la tierra / corriente de fuga y función de aislamiento.
- Alta capacidad de resistencia a la corriente de cortocircuito.
- Equipado con terminales de conexión protegidos con los dedos.
- Las piezas de plástico resistentes al fuego soportan un calentamiento anormal y un fuerte impacto.
- Desconecta automáticamente el circuito cuando la corriente de fuga / fallo a tierra se produce y supera la sensibilidad nominal.
- Independiente de la fuente de alimentación y del voltaJe de línea, y libre de interferencias externas fluctuación de tensión.

Datos técnicos

- Modelo: RV3-1E
- Poder de corte: 10kA IEC61008-1
- Modo: tipo electromagnético
- Nº Polos: 2P
- Corriente nominal (A): 30
- Voltaje nominal: 240/415V AC
- Frecuencia nominal: 50 / 60 Hz
- Resistencia electromecánica: 4000 ciclos
- Tensión nominal soportada de impulso: 10KA
- Características de corriente residual: A, AC, G, S ¿?¿?¿?¿?¿?¿?
- Clases y empleo
  ACD = Fugas en AC. Residencial
- Clase de protección: IP20
- Indicación de posición de contacto
- Conpatible con series RV30
- Permite empleo de peines de conexión tipo pin
- Capacidad de conexión:
  Conductor rígido 25mm^2.
  Par de apriete: 2.0Nm
- Instalación:
  En carril simétrico DIN 35mm.
  Montaje en panel
  Altura de conexión del terminal: 19 mm

CB CE RoHS

Interruptores diferenciales RV31- E

Dimensiones generales y de instalación

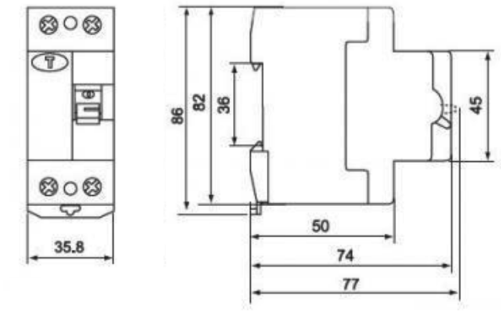
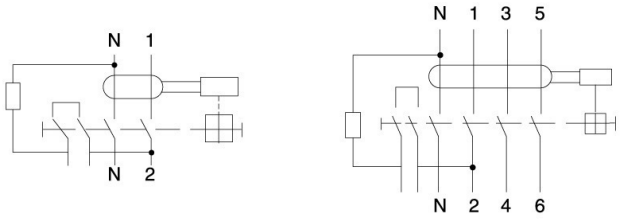


Diagrama de cableado



Descanso de la acción residual

Tipo	In/A	IΔn/A	La corriente residual (IΔn) corresponde a los siguientes tiempos de ruptura				
			IΔn	2IΔn	5IΔn	5A, 1A, 20A, 50A, 100A,200A, 500A	
Tipo general	Cualquier valor	Cualquier valor	0.3	0.15	0.04	0.04	Tiempo de descanso máximo
Tipo S	≥ 25	> 0.03	0.5	0.2	0.15	0.15	Tiempo de descanso máximo
			0.13	0.06	0.05	0.04	Tiempo de no-conducción mínimo
Tipo G	Cualquier valor	Cualquier valor	0.5	0.2	0.15	0.15	Tiempo de descanso máximo
			0.01	0.01	0.01	0.01	Tiempo de no-conducción mínimo

El tipo general RCBO cuya corriente IΔn es 0,003 mA o menos puede utilizar 0.25A en lugar de 5L IΔn

Interruptor de circuito de corriente residual operado, rango de corriene de disparo

Tipo	Tipo de disparo		
AC	0,5IΔn <		
A	ángulo de retardo	1.30In	t ≤ 1h (In ≤ 63A) t < 2 h (In > 63A)
	0º	2In	10s < t < 60s(In ≤ 63A) 20s < t < 120s(In > 63A)
	90º	8In	t ≤ 0.2s
	135º	12In	t < 0.2s