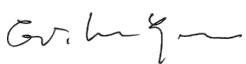





<b>TEST REPORT</b> <b>IEC 62955:2018</b> <b>Residual direct current detecting device (RDC-DD) to be used for mode 3 charging of electric vehicles</b>	
<b>Report No.</b> .....	64.105.21.30939.01
<b>Date of issue</b> .....	2022-01-07
<b>Project handler</b> .....	Guihua Yuan
<b>Testing laboratory</b> .....	TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch
<b>Address</b> .....	5F, Communication Building, 163 Pingyun Rd, Huangpu West Ave., 510656 Guangzhou, People's Republic of China
<b>Testing location</b> .....	See page 3 for details
<b>Client</b> .....	Autel New Energy Co.,Ltd.
<b>Client number</b> .....	114397
<b>Address</b> .....	Room 101, Building B2, Zhiyuan, No.1001 Xueyuan Avenue, Changyuan Community, Taoyuan Road, Nanshan District, Shenzhen, 518055, China
<b>Contact person</b> .....	Mr. Wu Jie
<b>Standard</b> .....	This TUV SUD test report form is based on the following requirements: IEC 62955:2018
<b>TRF number and revision</b> .....	TRF IEC 62955:2018 rev. 00
<b>eDoc_ID</b> .....	N/A
<b>TRF originated by</b> .....	TUV SUD Product Service, Mr./Ms.
<b>Copyright blank test report</b> .....	This test report is based on the content of the standard (see above). The test report considered selected clauses of the a.m. standard(s) and experience gained with product testing. It was prepared by TUV SUD Product Service.  TUV SUD Group takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.
<b>General disclaimer</b> .....	This test report may only be quoted in full. Any use for advertising purposes must be granted in writing. This report is the result of a single examination of the object in question and is not generally applicable evaluation of the quality of other products in regular production.
<b>Scheme</b> .....	<input type="checkbox"/> TUV Mark: <input checked="" type="checkbox"/> without certification: <input type="checkbox"/> AoC/CoC for EU-Directive / Bauart mark                      test report only                      EU-Regulation: <input type="checkbox"/> GS Mark <input type="checkbox"/> NRTL Mark <input type="checkbox"/> other:
<b>Non-standard test method</b> .....	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes, see details under <i>Summary of testing</i>
<b>National deviations</b> .....	N/A
<b>Number of pages (Report)</b> .....	18
<b>Number of pages (Attachments)</b> ..	Attachment no.1: 104 Attachment no.2: 5
<b>Compiled by:</b> Guihua Yuan <b>(+ signature)</b> 	<b>Approved by:</b> Martin Ma <b>(+ signature)</b> 



<b>Test sample</b> ..... : Residual direct current detecting device <b>Type of test object</b> ..... : RDC-PD of Maxi C-SE AC W22-C5-4G-B <b>Trademark</b> ..... : Autel <b>Model and/ or type reference</b> ..... : RDC-PD of Maxi C-SE AC W22-C5-4G-B <b>Rating(s)</b> ..... : 32A, 230/400V~ 50/60Hz Detail information of product see "general product information" <b>Manufacturer</b> ..... : Same as applicant <b>Manufacturer number</b> ..... : Same as applicant <b>Address</b> ..... : Same as applicant													
<b>Name and address of factory(ies)</b> . Autel Intelligent Technology Corp.,Ltd. Guangming Branch 6F, West Wing and 7F&6F, East Wing, Building 2, and 6F of Electronical Building, Yanxiang Industrial Zone, Gaoxin Rd, Dongzhou Community of Guangming New District, Shenzhen, 518000, China													
<b>Sub-contractors / tests (clause) ...</b> : N/A <b>Name</b> ..... : N/A													
<b>Order description</b> ..... : <input checked="" type="checkbox"/> Complete test according to TRF <input type="checkbox"/> Partial test according to manufacturer's specifications <input type="checkbox"/> Preliminary test <input type="checkbox"/> Spot check <input type="checkbox"/> Others:													
<b>Date of order</b> ..... : 2021-11-25 <b>Date of receipt of test item</b> ..... : 2021-11-25 <b>Date(s) of performance of test</b> ..... : 2021-11-25 to 2022-01-07													
<b>Tests performed (name of test and test clause):</b> This test report 64.105.21.30939.01 is based on the report 64.105.21.30160.01 and will be used in conjunction with it. In this report, the class of residual direct current detecting device (RDC-DD) was updated from RDC-MD to RDC-PD. And the RCD module was changed from MC003E5-C1 to MC003E3-C1. The rating of RDC-PD, Un=230V/400V, 50/60 Hz, 32A, I <sub>Δn</sub> =30mA, I <sub>Δdc</sub> =6mA, I <sub>m</sub> =500A, I <sub>Δm</sub> =500A, I <sub>nc</sub> =1000A, I <sub>Δc</sub> =1500A. The test details as following: IEC62955 part: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <th style="width: 20%;">Test sequence</th> <th style="width: 15%;">Subclause</th> <th style="width: 40%;">Test (or inspection)</th> <th style="width: 25%;">Sample no.</th> </tr> <tr> <td>B</td> <td>9.8</td> <td>Temperature rise</td> <td>B1, B2, B3</td> </tr> <tr> <td>D0</td> <td>9.9</td> <td>Residual operating characteristics</td> <td>D1, D2, D3</td> </tr> </table> Tests according to Annex O were reconsidered in this report. EN 61008 part see attachment no.1 for details. EMC part wasn't considered in this test report. The submitted samples were found to comply with the requirements of IEC 62955:2018 and relevant standard requirements. Except the following information: The rated conditional short-circuit current I <sub>nc</sub> 1000A, Between live parts which are separated when the main contacts are in the open position: 3.2mm.	Test sequence	Subclause	Test (or inspection)	Sample no.	B	9.8	Temperature rise	B1, B2, B3	D0	9.9	Residual operating characteristics	D1, D2, D3	<b>Testing location:</b> Autel New Energy Co.,Ltd. Room 101, Building B2, Zhiyuan, No.1001 Xueyuan Avenue, Changyuan Community, Taoyuan Road, Nanshan District, Shenzhen, 518055, China
Test sequence	Subclause	Test (or inspection)	Sample no.										
B	9.8	Temperature rise	B1, B2, B3										
D0	9.9	Residual operating characteristics	D1, D2, D3										

<b>Purpose of the product</b> (description of intended use):  This RDC-PD is an integral part of the charging system.  The rating of RDC-PD, Un=230V/400V, 50/60 Hz, 32A, I $\Delta$ n=30mA, I $\Delta$ dc=6mA, Im=500A, I $\Delta$ m=500A, Inc=1000A, I $\Delta$ c=1500A.
<b>Characteristic data</b> (not shown on the marking plate):  N/A
<b>Attachments:</b>  Attachment no.1: EN 61008 part (104 pages). Attachment no.2: Photo documentation (5 pages).
<b>If additional information is necessary, please provide</b>  N/A
<b>Copy of marking plate:</b>  The following marking should be checked in the end-use product.  Un=230V/400V, 50/60 Hz, 32A, I $\Delta$ n=30mA, I $\Delta$ dc=6mA, Im=500A, ambient air temperature range -5 °C up to 40 °C
<b>Pictures of the product:</b>  See photo doc. for details
<b>Summary of testing:</b>  All the test results in this test report are positive.  <input type="checkbox"/> deviation(s) found <input checked="" type="checkbox"/> no deviations found
<b>Additional information on non-standard test method(s)</b> <b>Sub clause</b> ..... : N/A <b>Page</b> ..... : N/A <b>Rational</b> ..... : N/A
<b>Possible test case verdicts:</b>  test case does not apply to the test object. : N/A (not applicable / not included in the order) test object does meet the requirement ..... : P (Pass) test object does not meet the requirement. : F (Fail)
<b>General remarks:</b>  <i>"(see remark #)" refers to a remark appended to the report.</i> <i>"(see appended table)" refers to a table appended to the report.</i> <i>Throughout this report a comma is used as the decimal separator.</i> <i>The test results presented in this report relate only to the object tested.</i> <i>This report shall not be reproduced except in full without the written approval of the testing laboratory.</i>

IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
<b>8.4</b>	<b>Temperature rise</b>		<b>P</b>
	Temperature rises do not exceed the limiting values stated in table 7.		P
	Cross-section (mm <sup>2</sup> )	6 mm <sup>2</sup>	P
9.8.1	Ambient air temperature (°C)	40°C	P
9.8.2	Test current I <sub>N</sub> (A) until steady state values are reached.	32A	P
	Four pole RDC-DDs:		P
	Current passing through		P
	- 3 phase poles (1)		P
	- neutral and adjacent pole (2)		P
	Parts .....Temperature rise K	See appended table for details	P
	Terminals for external connections (K) .....65	B1 – Max. 26.8K B2 – Max. 27.2K B3 – Max. 28.0K	P
	External parts liable to be touched during manual operation of the RDC-DD, including operating means of insulating material and metallic means for coupling insulated operating means of several poles (K)..... 40	B1 – B2 – B3 –	N/A
	External metallic parts of operating means (K)..25	B1 – B2 – B3 –	N/A
	Other external parts, including that face of the RDC-DD in direct contact with the mounting surface (K).....60	B1 – 29.9K B2 – 30.2K B3 – 31.1K	P

	<b>TEST SEQUENCE D (3 samples)</b>	<b>P</b>
	<b>Tests "D0"</b>	<b>P</b>
<b>8.5</b>	<b>Operating characteristics</b>	<b>P</b>
	The operating characteristic of RDC-DDs shall comply with the requirements of 9.9.1, 9.9.2 and 9.9.3 as applicable.	P
9.9.1	RDC-DD installed as for normal use	P
	For tests according to 9.9.2, the test circuit shall correspond to Figure 3.	P
	For tests according to 9.9.3, the test circuit shall correspond to Figure 2.	P

IEC 62955																					
Clause	Requirement + Test				Result - Remark				Verdict												
	The tests are carried out at 0,85 times and 1,1 times rated voltage also in case where supplied between any two poles.; voltage (V) ..... : 195.5V/340V-253V/440V								P												
	Unless otherwise specified, the tests are performed with no load at the reference temperature of 20 °C ± 5 °C.								P												
	The RDC-DD shall perform the tests of 9.9.2 and 9.9.3, as applicable. Each test is made on one pole only, taken at random, with five measurements, unless otherwise specified.								P												
	Off-load tests made at a temperature of 20 ± 5 °C								P												
Test voltage: 0.85xUn= 195.5V/340V																					
9.9.2	Verification of correct operation of RDC-DDs with smooth DC residual current								P												
9.9.2.1	Verification of correct operation in case of a steady increase of smooth DC residual current								P												
	- steady increase from 2mA to 6mA within 30 s								P												
	- tripping current between 2mA to 6mA (mA) .. :				# D1	4.6	4.6	4.6	4.8	4.8	P										
					# D2	4.3	4.2	4.2	5.1	5.0											
					# D3	4.6	4.5	4.5	4.9	4.9											
9.9.2.2	Verification of correct operation on closing on a smooth DC residual current								P												
	- the RDC-DD closes on I <sub>DN</sub> : no value exceeds the specified limiting value of Table 2 (ms)								P												
	Table 2 – Maximum values of break times for residual direct currents								—												
	<table><tr><th colspan="3">Standard values of maximum break time at a residual direct current equal to</th></tr><tr><th colspan="3">s</th></tr><tr><th>6 mA</th><th>60 mA</th><th>200 mA</th></tr><tr><td>10,0</td><td>0,3</td><td>0,1</td></tr></table>				Standard values of maximum break time at a residual direct current equal to			s			6 mA	60 mA	200 mA	10,0	0,3	0,1					
Standard values of maximum break time at a residual direct current equal to																					
s																					
6 mA	60 mA	200 mA																			
10,0	0,3	0,1																			
	- maximum break time (ms) at: 6mA ..... :				# D1	50.2	50.6	50.7	50.3	49.9	P										
					# D2	48.7	47.8	48.9	53.9	55.2											
					# D3	49.4	49.8	49.1	52.0	52.0											
	- maximum break time (ms) at: 60mA ..... :				# D1	15.6	16.4	16.1	15.3	16.2	P										
					# D2	16.0	16.1	15.7	16.2	15.5											
					# D3	15.5	16.1	15.3	16.2	16.3											
	- maximum break time (ms) at: 200mA ..... :				# D1	13.5	13.5	13.5	13.9	14.4	P										
					# D2	14.0	15.2	14.4	13.2	14.2											
					# D3	14.4	13.6	12.1	13.7	13.3											
	No value exceeds the relevant specified limiting value								P												
9.9.2.3	Verification of correct operation in case of sudden appearance of smooth DC residual current (20 ± 2) °C								P												

IEC 62955																										
Clause	Requirement + Test	Result - Remark						Verdict																		
	The test circuit being successively calibrated at each of the values of residual current specified in Table 2, the test switch S2 and the RDC-DD being in the closed position, the test voltage is suddenly established by closing the test switch S1. The break time is measured five times.							—																		
	Table 2 – Maximum values of break times for residual direct currents <table><tr><th colspan="3">Standard values of maximum break time at a residual direct current equal to</th></tr><tr><th colspan="3">s</th></tr><tr><th>6 mA</th><th>60 mA</th><th>200 mA</th></tr><tr><td>10,0</td><td>0,3</td><td>0,1</td></tr></table>							Standard values of maximum break time at a residual direct current equal to			s			6 mA	60 mA	200 mA	10,0	0,3	0,1							—
Standard values of maximum break time at a residual direct current equal to																										
s																										
6 mA	60 mA	200 mA																								
10,0	0,3	0,1																								
	- maximum break time (ms) at: 6mA .....	# D1	50.3	50.1	50.2	50.7	50.7	P																		
		# D2	48.3	47.5	48.4	54.8	55.2																			
		# D3	49.0	49.1	49.1	51.9	52.0																			
	- maximum break time (ms) at: 60mA .....	# D1	15.6	16.4	16.0	16.1	16.5	P																		
		# D2	16.1	16.2	15.8	16.3	15.9																			
		# D3	16.5	15.9	15.7	16.2	16.3																			
	- maximum break time (ms) at: 200mA .....	# D1	13.1	15.1	13.6	13.6	13.3	P																		
		# D2	13.7	14.2	13.8	15.1	14.8																			
		# D3	13.3	15.0	13.5	13.4	13.5																			
	No value exceeds the relevant specified limiting value							P																		
9.9.2.4	Verification of correct operation with load							P																		
	The tests of 9.9.2.2 and 9.9.2.3 are repeated, the pole under test and one other pole of the RDC-DD being loaded with rated current $I_n$ , this current being established shortly before the test.							P																		
	For the test of 9.9.2.3, the switch S1 and RDC-DD are in the closed position. The residual current is established by closing S2.							P																		
9.9.2.2	Verification of correct operation on closing on a smooth DC residual current							P																		
	- the RDC-DD closes on $I_{Dn}$ : no value exceeds the specified limiting value of Table 2 (ms)							P																		
	Table 2 – Maximum values of break times for residual direct currents <table><tr><th colspan="3">Standard values of maximum break time at a residual direct current equal to</th></tr><tr><th colspan="3">s</th></tr><tr><th>6 mA</th><th>60 mA</th><th>200 mA</th></tr><tr><td>10,0</td><td>0,3</td><td>0,1</td></tr></table>							Standard values of maximum break time at a residual direct current equal to			s			6 mA	60 mA	200 mA	10,0	0,3	0,1							—
Standard values of maximum break time at a residual direct current equal to																										
s																										
6 mA	60 mA	200 mA																								
10,0	0,3	0,1																								
	- maximum break time (ms) at: 6mA .....	# D1	50.3	50.0	50.8	47.7	72.0	P																		
		# D2	49.3	50.2	49.8	52.7	53.2																			
		# D3	44.5	44.1	43.0	53.1	52.7																			
	- maximum break time (ms) at: 60mA .....	# D1	16.1	16.5	15.5	15.9	15.8	P																		
		# D2	16.0	15.7	16.1	15.4	16.2																			
		# D3	16.4	16.0	15.7	16.1	16.6																			

IEC 62955											
Clause	Requirement + Test	Result - Remark						Verdict			
	- maximum break time (ms) at: 200mA ..... :	# D1	15.2	14.0	13.3	14.1	13.7	P			
		# D2	13.9	14.1	14.9	14.5	14.5				
		# D3	14.3	14.3	14.0	13.6	13.7				
	No value exceeds the relevant specified limiting value							P			
9.9.2.3	<b>Verification of correct operation in case of sudden appearance of smooth DC residual current (20 ± 2) °C</b>							P			
	The test circuit being successively calibrated at each of the values of residual current specified in Table 2, the test switch S2 and the RDC-DD being in the closed position, the test voltage is suddenly established by closing the test switch S1. The break time is measured five times.							—			
	- maximum break time (ms) at: 6mA ..... :	# D1	47.1	48.3	48.7	48.3	47.2	P			
		# D2	50.2	49.5	49.7	53.6	53.2				
		# D3	44.5	43.4	44.2	53.9	53.5				
	- maximum break time (ms) at: 60mA ..... :	# D1	15.3	15.9	15.7	17.0	15.9	P			
		# D2	15.7	16.6	16.1	16.2	15.5				
		# D3	16.4	16.1	16.9	15.8	15.8				
	- maximum break time (ms) at: 200mA ..... :	# D1	13.3	13.6	13.6	13.7	13.4	P			
		# D2	13.7	15.4	13.8	13.9	13.6				
		# D3	14.0	13.6	13.3	13.8	14.5				
	No value exceeds the relevant specified limiting value							P			
9.9.2.6	<b>Verification of the correct operation in case of residual direct currents which may result from rectifying circuits supplied from two phases</b>							P			
	only for 2-pole RDC-DDs operating on a two-phase supply.							P			
	a) The test shall be performed according to Figure 4.							P			
	The test switches S1 and S2 and the RDC-DD being in the closed position, the residual pulsating direct current is steadily increased, starting from a value not higher than 2 mA, trying to attain the value of 7 mA within 30 s, the tripping current being measured.							P			
	The RDC-DD is tested five times at each positions I and II of S3.							P			
	At each position I of S3.							—			
	The test switches S1 and S2 and the RDC-DD being in the closed position, the residual pulsating direct current is steadily increased, starting from a value not higher than 2 mA,	# D1	5.1	5.0	5.0	5.1	5.0	P			
		# D2	4.6	4.5	4.6	4.5	4.6				

IEC 62955									
Clause	Requirement + Test	Result - Remark						Verdict	
	trying to attain the value of 7 mA within 30 s, the tripping current being measured. The RDC-DD shall trip within the limits of 3.5 mA to 7 mA.	# D3	4.6	4.5	4.6	4.5	4.6		
	At each position II of S3.							—	
	The test switches S1 and S2 and the RDC-DD being in the closed position, the residual pulsating direct current is steadily increased, starting from a value not higher than 2 mA, trying to attain the value of 7 mA within 30 s, the tripping current being measured. The RDC-DD shall trip within the limits of 3,5 mA to 7 mA.	# D1	4.9	4.9	4.9	4.9	4.9	P	
		# D2	6.0	6.0	6.0	6.0	6.0		
		# D3	5.4	5.4	5.2	5.2	5.2		
	<b>b) A second series of tests is made to verify the break time.</b>								P
	The test circuit being successively calibrated at current values of 60 mA and 200 mA, the test switch S1 and the RDC-DD being in the closed position, the residual current is suddenly established by closing the test switch S2.							P	
	With the RDC-DD connected at two-line terminals chosen at random, five measurements of the break time are made at each test current at each position I and II of S3.							P	
	The break times shall be in compliance with the values given in Table 2.							P	
	At each position I of S3.							—	
	- maximum break time (ms) at: 60mA .....	# D1	22.5	21.3	30.2	21.8	28.2	P	
		# D2	23.3	25.4	28.1	25.8	26.1		
		# D3	22.1	28.9	28.8	28.2	27.8		
	- maximum break time (ms) at: 200mA .....	# D1	13.2	10.4	19.3	12.4	16.5	P	
		# D2	16.4	18.1	13.4	17.1	14.4		
		# D3	14.7	11.1	20.7	11.9	20.3		
	No value exceeds the relevant specified limiting value							P	
	At each position II of S3.							—	
	- maximum break time (ms) at: 60mA .....	# D1	16.6	20.3	18.7	18.4	18.9	P	
		# D2	16.1	28.0	17.2	28.4	17.9		
		# D3	18.6	15.7	17.4	14.3	16.4		
	- maximum break time (ms) at: 200mA .....	# D1	9.7	11.0	10.6	11.5	10.8	P	
		# D2	9.4	20.2	9.1	21.3	10.2		
		# D3	8.7	15.6	9.8	14.6	10.2		



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Clause	Requirement + Test	Result - Remark						Verdict	
	No value exceeds the relevant specified limiting value							P	
9.9.2.7	<b>Verification of the correct operation in case of residual direct currents which may result from rectifying circuits supplied from three phases</b>							<b>P</b>	
	only for 3-pole and 4-pole RDC-DDs operating on a three-phase supply.							P	
	a) The test shall be performed according to Figure 5.							P	
	The test switches S1 and S2 and the RDC-DD being in the closed position, the residual pulsating direct current is steadily increased, starting from a value not higher than 2 mA, trying to attain the value of 6,2 mA within 30 s, while measuring the tripping current.							P	
	The RDC-DD is tested five times at each positions I and II of S3.							P	
	The RDC-DD shall trip within the limits of 3,1 mA to 6,2 mA.							P	
	At each position I of S3.							—	
	The test switches S1 and S2 and the RDC-DD being in the closed position, the residual pulsating direct current is steadily increased, starting from a value not higher than 2 mA, trying to attain the value of 6,2 mA within 30 s, while measuring the tripping current.  The RDC-DD shall trip within the limits of 3,1 mA to 6,2 mA.	# D1	4.6	4.6	4.7	4.7	4.7	P	
		# D2	4.2	4.2	4.2	4.2	4.2		
		# D3	4.4	4.4	4.4	4.4	4.4		
	At each position II of S3.							—	
	The test switches S1 and S2 and the RDC-DD being in the closed position, the residual pulsating direct current is steadily increased, starting from a value not higher than 2 mA, trying to attain the value of 6,2 mA within 30 s, while measuring the tripping current.  The RDC-DD shall trip within the limits of 3,1 mA to 6,2 mA.	# D1	4.7	4.6	4.6	4.6	4.7	P	
		# D2	5.1	5.1	5.1	5.1	5.1		
		# D3	4.9	4.9	4.9	4.9	4.9		
	<b>b) A second series of tests is made to verify the break time.</b>							P	
	The test circuit being successively calibrated at current values of 60 mA and 200 mA, the test switch S1 and the RDC-DD being in the closed position, the residual current is suddenly established by closing the test switch S2.							P	
	five measurements of the break time are made at each test current at each position I and II of S3.							P	
	The break times shall be in compliance with the values given in Table 2.							P	

IEC 62955										
Clause	Requirement + Test	Result - Remark						Verdict		
	At each position I of S3.							—		
	- maximum break time (ms) at: 60mA ..... :	# D1	15.0	18.7	21.6	19.5	20.7	P		
		# D2	20.8	16.7	22.1	16.2	21.8			
		# D3	21.5	20.0	20.1	20.3	20.7			
	- maximum break time (ms) at: 200mA ..... :	# D1	10.9	11.8	10.2	12.5	12.2	P		
		# D2	13.9	13.6	14.0	12.6	13.4			
		# D3	8.6	11.3	9.2	11.6	10.2			
	At each position II of S3.							—		
	- maximum break time (ms) at: 60mA ..... :	# D1	18.4	21.6	20.4	23.4	24.4	P		
		# D2	16.5	17.8	15.8	17.6	15.2			
		# D3	22.5	17.0	22.2	17.4	21.4			
	- maximum break time (ms) at: 200mA ..... :	# D1	9.8	12.3	9.2	16.7	12.2	P		
		# D2	12.5	12.2	11.8	12.5	12.8			
		# D3	8.9	12.1	9.7	12.7	10.3			
	No value exceeds the relevant specified limiting value							P		
Test voltage: 1.1xUn= 253/440V										
9.9.2	Verification of correct operation of RDC-DDs with smooth DC residual current							P		
9.9.2.1	Verification of correct operation in case of a steady increase of smooth DC residual current							P		
	- steady increase from 2mA to 6mA within 30 s							P		
	- tripping current between 2mA to 6mA (mA) ... :	# D1	4.6	4.6	4.6	4.8	4.8	P		
		# D2	4.7	4.7	4.5	4.7	4.8			
		# D3	4.4	4.4	4.4	5.0	4.9			
9.9.2.2	Verification of correct operation on closing on a smooth DC residual current							P		
	- the RDC-DD closes on I <sub>Dn</sub> : no value exceeds the specified limiting value of Table 2 (ms)							P		
	Table 2 – Maximum values of break times for residual direct currents							—		
Standard values of maximum break time at a residual direct current equal to										
s										
6 mA	60 mA	200 mA								
10,0	0,3	0,1								
	- maximum break time (ms) at: 6mA ..... :	# D1	50.7	50.4	50.4	50.4	49.7	P		
		# D2	50.9	50.6	49.0	50.7	52.4			
		# D3	47.8	48.2	47.9	51.9	52.3			
	- maximum break time (ms) at: 60mA ..... :	# D1	15.8	15.8	16.3	16.3	16.4	P		
		# D2	15.6	16.1	16.1	15.8	15.4			
		# D3	16.0	16.0	15.3	16.2	15.4			

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Clause	Requirement + Test	Result - Remark						Verdict																		
	- maximum break time (ms) at: 200mA ..... :	# D1	13.3	14.9	14.5	13.8	13.4	P																		
		# D2	13.7	13.3	13.7	14.6	14.2																			
		# D3	11.9	13.9	14.4	13.5	14.1																			
	No value exceeds the relevant specified limiting value							P																		
9.9.2.3	Verification of correct operation in case of sudden appearance of smooth DC residual current (20 ± 2) °C							P																		
	The test circuit being successively calibrated at each of the values of residual current specified in Table 2, the test switch S2 and the RDC-DD being in the closed position, the test voltage is suddenly established by closing the test switch S1. The break time is measured five times.							—																		
	Table 2 – Maximum values of break times for residual direct currents <table><tr><th colspan="3">Standard values of maximum break time at a residual direct current equal to</th></tr><tr><th colspan="3">s</th></tr><tr><th>6 mA</th><th>60 mA</th><th>200 mA</th></tr><tr><td>10,0</td><td>0,3</td><td>0,1</td></tr></table>							Standard values of maximum break time at a residual direct current equal to			s			6 mA	60 mA	200 mA	10,0	0,3	0,1							—
Standard values of maximum break time at a residual direct current equal to																										
s																										
6 mA	60 mA	200 mA																								
10,0	0,3	0,1																								
	- maximum break time (ms) at: 6mA ..... :	# D1	49.9	50.7	50.0	50.8	50.9	P																		
		# D2	50.7	50.4	50.1	52.1	50.7																			
		# D3	47.8	48.2	47.5	52.7	53.5																			
	- maximum break time (ms) at: 60mA ..... :	# D1	15.7	15.8	16.2	15.1	17.1	P																		
		# D2	16.2	15.5	15.5	16.3	16.0																			
		# D3	15.3	14.9	16.1	16.1	15.4																			
	- maximum break time (ms) at: 200mA ..... :	# D1	15.1	12.0	13.7	15.2	13.3	P																		
		# D2	14.3	13.9	15.1	13.6	13.6																			
		# D3	14.8	15.3	13.3	14.1	15.0																			
	No value exceeds the relevant specified limiting value							P																		
9.9.2.4	Verification of correct operation with load							P																		
	The test switch S1 and the RDC-DD being in the closed position, the residual current is suddenly established by closing the test switch S2							P																		
	rated current I <sub>n</sub> :							P																		
	With the test switches S1 and S2 and the RDC-DD in the closed position, the residual current is steadily increased, starting from a value not higher than 2mA, to try to attain the value of 6 mA within 30 s.  All five measured values shall be between 3 mA and 6 mA DC.	# D1	5.0	5.1	5.1	4.3	4.3	P																		
		# D2	4.4	4.3	4.4	4.8	4.8																			
		# D3	4.2	4.2	4.3	5.1	5.1																			
9.9.2.2	Verification of correct operation on closing on a smooth DC residual current							P																		
	- the RDC-DD closes on I <sub>Dn</sub> : no value exceeds the specified limiting value of Table 2 (ms)							P																		

IEC 62955																								
Clause	Requirement + Test					Result - Remark						Verdict												
	<div>Table 2 – Maximum values of break times for residual direct currents</div> <div><table><tr><th colspan="3">Standard values of maximum break time at a residual direct current equal to</th></tr><tr><th colspan="3">s</th></tr><tr><th>6 mA</th><th>60 mA</th><th>200 mA</th></tr><tr><td>10,0</td><td>0,3</td><td>0,1</td></tr></table></div>					Standard values of maximum break time at a residual direct current equal to			s			6 mA	60 mA	200 mA	10,0	0,3	0,1							—
Standard values of maximum break time at a residual direct current equal to																								
s																								
6 mA	60 mA	200 mA																						
10,0	0,3	0,1																						
	- maximum break time (ms) at: 6mA ..... :					# D1	54.9	54.6	54.5	47.0	47.1	P												
						# D2	49.4	47.5	49.5	50.0	51.6													
						# D3	45.8	47.0	47.5	51.0	52.8													
	- maximum break time (ms) at: 60mA ..... :					# D1	15.5	15.2	16.1	17.0	15.7	P												
						# D2	16.5	16.1	15.8	15.4	15.8													
						# D3	16.1	15.7	15.0	16.2	16.2													
	- maximum break time (ms) at: 200mA ..... :					# D1	13.1	14.3	14.7	13.2	14.4	P												
						# D2	14.3	15.6	14.0	14.1	14.5													
						# D3	13.9	13.9	14.4	14.9	14.1													
	No value exceeds the relevant specified limiting value											P												
9.9.2.3	Verification of correct operation in case of sudden appearance of smooth DC residual current (20 ± 2) °C										P													
	The test circuit being successively calibrated at each of the values of residual current specified in Table 2, the test switch S2 and the RDC-DD being in the closed position, the test voltage is suddenly established by closing the test switch S1. The break time is measured five times.										—													
	- maximum break time (ms) at: 6mA ..... :					# D1	54.9	54.5	53.9	47.3	47.0	P												
						# D2	52.6	49.0	47.9	47.9	49.3													
						# D3	45.4	45.0	45.1	51.9	49.7													
	- maximum break time (ms) at: 60mA ..... :					# D1	15.8	16.2	16.0	15.2	15.6	P												
						# D2	16.0	16.0	15.7	15.7	16.2													
						# D3	16.1	15.3	16.6	16.2	16.3													
	- maximum break time (ms) at: 200mA ..... :					# D1	13.4	14.7	13.1	13.5	12.4	P												
						# D2	15.6	14.4	14.4	13.7	15.3													
						# D3	13.7	14.6	15.1	13.8	12.3													
	No value exceeds the relevant specified limiting value											P												
9.9.2.5	Tests at the temperature limits										P													
	The RDC-DD shall perform the tests specified in 9.9.2.3 at 1.1 Un under the following conditions, successively:										—													
	a) ambient temperature:											P												
	1) -5 °C, off-load, for RDC-DDs classified according to a) of 4.5; or 2) -25 °C, off-load, for RDC-DDs classified according to b) of 4.5.					-5°C						—												

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Clause	Requirement + Test					Result - Remark					Verdict
9.9.2.3	<b>Verification of correct operation in case of sudden appearance of smooth DC residual current</b>										P
	The test circuit being successively calibrated at each of the values of residual current specified in Table 2, the test switch S2 and the RDC-DD being in the closed position, the test voltage is suddenly established by closing the test switch S1. The break time is measured five times.										—
	- maximum break time (ms) at: 6mA .....	# D1	49.8	50.6	50.7	49.5	50.2	P			
# D2		50.2	50.6	50.3	52.4	50.6					
# D3		48.3	48.7	47.9	52.2	52.5					
	- maximum break time (ms) at: 60mA .....	# D1	14.2	15.6	15.7	15.2	17.9	P			
# D2		15.4	14.6	14.8	15.3	16.2					
# D3		14.3	14.4	16.4	16.7	14.6					
	- maximum break time (ms) at: 200mA .....	# D1	14.5	12.4	13.2	15.4	13.7	P			
# D2		14.9	14.5	15.7	13.8	14.6					
# D3		15.8	14.3	14.7	14.9	15.5					
	No value exceeds the relevant specified limiting value										P
	<b>b) ambient temperature: +40 °C, the RDC-DD having been previously loaded with the rated current, until it attains thermal steady-state conditions.</b>										P
	- test current (A): In at a temperature of +40 °C: until steady state conditions are reached .....					+40 °C					—
	- cross-sectional area (mm²) .....					6mm²					—
9.9.2.3	<b>Verification of correct operation in case of sudden appearance of smooth DC residual current</b>										P
	The test circuit being successively calibrated at each of the values of residual current specified in Table 2, the test switch S2 and the RDC-DD being in the closed position, the test voltage is suddenly established by closing the test switch S1. The break time is measured five times.										—
	- maximum break time (ms) at: 6mA .....	# D1	53.7	54.2	52.5	49.2	48.4	P			
# D2		51.6	48.5	47.6	48.2	49.2					
# D3		46.4	46.5	45.7	50.4	49.3					
	- maximum break time (ms) at: 60mA .....	# D1	14.8	16.1	16.8	15.7	14.9	P			
# D2		16.4	15.7	15.2	14.7	15.7					
# D3		16.7	14.9	16.3	16.7	15.4					
	- maximum break time (ms) at: 200mA .....	# D1	14.4	13.3	13.7	13.8	12.2	P			
# D2		14.6	14.1	14.9	13.3	14.9					
# D3		13.2	14.3	16.5	14.6	12.8					
	No value exceeds the relevant specified limiting value										P
9.9.2.6	<b>Verification of the correct operation in case of residual direct currents which may result from rectifying circuits supplied from two phases</b>										P

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Clause	Requirement + Test	Result - Remark						Verdict
	only for 2-pole RDC-DDs operating on a two-phase supply.							P
	a) The test shall be performed according to Figure 4.							P
	The test switches S1 and S2 and the RDC-DD being in the closed position, the residual pulsating direct current is steadily increased, starting from a value not higher than 2 mA, trying to attain the value of 7 mA within 30 s, the tripping current being measured.							P
	The RDC-DD is tested five times at each positions I and II of S3.							P
	At each position I of S3.							—
	The test switches S1 and S2 and the RDC-DD being in the closed position, the residual pulsating direct current is steadily increased, starting from a value not higher than 2 mA, trying to attain the value of 7 mA within 30 s, the tripping current being measured.  The RDC-DD shall trip within the limits of 3,5 mA to 7 mA.	# D1	5.5	5.5	5.6	5.5	5.6	P
		# D2	5.4	5.4	5.4	5.4	5.4	
		# D3	5.5	5.5	5.4	5.5	5.4	
	At each position II of S3.							—
	The test switches S1 and S2 and the RDC-DD being in the closed position, the residual pulsating direct current is steadily increased, starting from a value not higher than 2 mA, trying to attain the value of 7 mA within 30 s, the tripping current being measured.  The RDC-DD shall trip within the limits of 3,5 mA to 7 mA.	# D1	4.5	4.4	4.5	4.4	4.5	P
		# D2	5.1	5.1	5.0	5.1	5.0	
		# D3	4.4	4.4	4.4	4.4	4.4	
	<b>b) A second series of tests is made to verify the break time.</b>							P
	The test circuit being successively calibrated at current values of 60 mA and 200 mA, the test switch S1 and the RDC-DD being in the closed position, the residual current is suddenly established by closing the test switch S2.							P
	With the RDC-DD connected at two-line terminals chosen at random, five measurements of the break time are made at each test current at each position I and II of S3.							P
	The break times shall be in compliance with the values given in Table 2.							P
	At each position I of S3.							—
	- maximum break time (ms) at: 60mA .....	# D1	28.0	26.5	27.7	25.5	25.2	P
		# D2	26.8	26.1	28.1	26.7	27.2	
		# D3	21.5	28.8	20.4	27.8	21.2	

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Clause	Requirement + Test	Result - Remark						Verdict		
	- maximum break time (ms) at: 200mA ..... :	# D1	12.4	18.8	17.6	17.2	17.1	P		
		# D2	21.2	18.1	21.3	18.3	20.3			
		# D3	13.8	15.4	12.3	15.6	12.4			
	No value exceeds the relevant specified limiting value							P		
	At each position II of S3.							—		
	- maximum break time (ms) at: 60mA ..... :	# D1	18.9	19.8	15.8	18.8	16.2	P		
		# D2	18.2	15.8	18.7	16.4	17.1			
		# D3	17.2	16.9	19.4	15.9	18.3			
	- maximum break time (ms) at: 200mA ..... :	# D1	10.5	11.3	10.7	11.4	11.7	P		
		# D2	12.1	13.4	14.6	13.9	13.6			
		# D3	13.1	14.8	9.3	15.8	10.4			
	No value exceeds the relevant specified limiting value							P		
9.9.2.7	Verification of the correct operation in case of residual direct currents which may result from rectifying circuits supplied from three phases							P		
	only for 3-pole and 4-pole RDC-DDs operating on a three-phase supply.							P		
	a) The test shall be performed according to Figure 5.							P		
	The test switches S1 and S2 and the RDC-DD being in the closed position, the residual pulsating direct current is steadily increased, starting from a value not higher than 2 mA, trying to attain the value of 6,2 mA within 30 s, while measuring the tripping current.							P		
	The RDC-DD is tested five times at each positions I and II of S3.							P		
	The RDC-DD shall trip within the limits of 3,1 mA to 6,2 mA.							P		
	At each position I of S3.							—		
	The test switches S1 and S2 and the RDC-DD being in the closed position, the residual pulsating direct current is steadily increased, starting from a value not higher than 2 mA, trying to attain the value of 7 mA within 30 s, the tripping current being measured.  The RDC-DD shall trip within the limits of 3,5 mA to 7 mA.	# D1	4.6	4.6	4.6	4.6	4.6	P		
		# D2	4.8	4.9	4.9	4.9	4.9			
		# D3	5.0	5.0	5.0	5.0	5.0			
	At each position II of S3.							—		
	The test switches S1 and S2 and the RDC-DD being in the closed position, the residual	# D1	4.7	4.7	4.7	4.7	4.7	P		

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Clause	Requirement + Test	Result - Remark						Verdict		
	pulsating direct current is steadily increased, starting from a value not higher than 2 mA, trying to attain the value of 7 mA within 30 s, the tripping current being measured.  The RDC-DD shall trip within the limits of 3,5 mA to 7 mA.	# D2	4.5	4.5	4.5	4.5	4.5			
		# D3	4.2	4.2	4.2	4.2	4.2			
	<b>b) A second series of tests is made to verify the break time.</b>							P		
	The test circuit being successively calibrated at current values of 60 mA and 200 mA, the test switch S1 and the RDC-DD being in the closed position, the residual current is suddenly established by closing the test switch S2.							P		
	five measurements of the break time are made at each test current at each position I and II of S3.							P		
	The break times shall be in compliance with the values given in Table 2.							P		
	At each position I of S3.							—		
	- maximum break time (ms) at: 60mA ..... :	# D1	16.7	20.8	20.8	19.2	19.6	P		
		# D2	20.6	21.5	16.3	20.7	17.3			
		# D3	21.4	21.1	21.9	21.3	20.7			
	- maximum break time (ms) at: 200mA ..... :	# D1	11.4	8.7	9.1	10.7	10.3	P		
		# D2	13.7	14.6	10.3	15.6	11.2			
		# D3	10.1	12.5	11.0	12.7	10.9			
	No value exceeds the relevant specified limiting value							P		
	At each position II of S3.							—		
	- maximum break time (ms) at: 60mA ..... :	# D1	18.1	17.4	15.8	17.6	16.8	P		
		# D2	21.6	17.3	20.6	17.5	21.2			
		# D3	21.2	18.5	16.9	18.7	17.6			
	- maximum break time (ms) at: 200mA ..... :	# D1	10.4	12.8	9.3	12.2	10.3	P		
		# D2	10.7	11.1	11.5	12.3	12.5			
		# D3	10.2	11.1	11.2	12.3	10.7			
	No value exceeds the relevant specified limiting value							P		



IEC 62955			
Clause	Requirement + Test	Result - Remark	Verdict
O	<b>ANNEX O</b> <b>RDC-PDs with integrated DC, pulsating DC (type A) and 6 mA DC detection, evaluation and mechanical switching in one unit according to classification 4.1.2</b>		P
O.1	<p>This annex applies to RDC-PD with integrated DC, pulsating DC and 6 mA DC detection, evaluation and mechanical switching in one unit.</p> <p>The main body of this document applies in all respects to devices covered by this annex, unless otherwise specified.</p>		—
	The requirements and tests of the following RCD standards apply as relevant:		—
	– IEC 61008-1 concerning RDC-PD integrated in RCCB function;		P
	– IEC 61009-1 concerning RDC-PD integrated in RCBO function.		N/A
O.6	<b>Marking and other product information</b>		P
O.6.1	<b>Marking of the RDC-M Module</b>		NP
	Clause 6 of this document applies, with the following addition:		—
	– the marking 6 f), 6 h), 6 l), 6 q), and 6r) according to IEC 61008-1;		P
	– the marking 6 d), 6 f), 6 h), 6 j), 6 l), 6m), 6 q), and 6r) according to IEC 61009-1.		N/A
O.7	<b>Requirements for construction and operation</b>		P
O.7.1	General		—
	RCD-PDs according to this annex shall comply with the requirements of IEC 61008-1 or 61009-1, as applicable for type A classification, unless otherwise specified in this annex.	IEC 61008-1 See Attachment no.1 for details	P
	Clause 7 of the present document applies with the following additions:		—
O.7.2	<b>Operating characteristic</b>		P
	The operating characteristic of RDC-PDs according to this annex shall comply with the requirements of 9.9 of the corresponding RCD standard as applicable, and in addition to the tests of 9.9.1 and 9.9.2.		P
O.8	Tests		P
O.8.1	Testing according to the RCD standard		P
	The tests of the relevant RCD standard apply without modification, the RDC-PD being supplied at rated voltage		P
	The tests of:		—
	– 9.9.3.1d) and 9.9.3.4 of IEC 61008-1:2010, or		P

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Clause	Requirement + Test	Result - Remark	Verdict
	– 9.9.1.3 a) and d) of IEC 61009-1:2010 shall be carried out.		N/A
	The device shall operate within the limits of Table 20 which replaces the required limits of Table 20 of IEC 61008-1 and Table 26 of IEC 61009-1.		—
O.8.2	Testing according to this document		P
O.8.2.1	Applicability of the tests according to this document		P
	The relevant tests are given in Table O.1		—
O.8.2.2	Verification of the operating characteristics according to the main part of this standard		N/A
	All the tests of 9.9 are to be performed, with the exception of those of 9.9.3 which are not relevant for this classification.		P
O.9	Routine tests on the RDC-PD		N/A
	The annex of the relevant RCD standard is applicable. In addition, the test according to D.2 applies.		N/A

Table_ Components			
Object / part No.	Manufacturer/ trademark	Technical data	Mark(s) of conformity
PCB	SHENZHEN MULTIAYER PCB TECHNOLOGY CO LTD	MTL-M, 130°C, V-0	UL E307592
Relay(K2,K3)	Panasonic Corporation Ise Factory	12VDC, AHES4291, 277VAC, 35A, 5E4,	VDE 40042442
Input and Output Terminal Block (J2,J3)	WEIDMUELLER INTERFACE GMBH & CO. KG	LU 10.16 Series, 2P, 3P, 300V, 65A	UL E60693
	Anytek Technology Corporation Ltd.	VP 10.16 Series 2P, 3P, 300V, 65A, T115	VDE 40041999
RCD module	Mega-phase Electronic Technology Ltd., Shanghai	MC003E3-C1, Input: 4.85~5.15V VDC, DC 6mA, 65mW, -40 to +105°C	Tested with appliance

**==End of report==**