

#### TEST REPORT IEC 61557-6

#### Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. – Equipment for testing, measuring or monitoring of protective measures Part 6: Effectiveness of residual current devices (RCD) in TT, TN and IT systems

Report Reference No	191013145GZU -003
Date of issue	28 Feb 2019
Total number of pages	23
Testing Laboratory	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Address :	Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD, Guangzhou, China
Applicant's name	Uni-Trend Technology (China) Co., Ltd
Address	No 6, Gong Ye Bei 1st Road Songshan Lake National High-Tech
	Industrial Development Zone, Dongguan City Guangdong Province, CHINA
Test specification:	
Standard:	IEC 61557-6:2007 (Second Edition), EN 61557-6:2007
Test procedure:	LVD
Non-standard test method	N/A
Test Report Form No	IEC61557_6A
TRF Originator	VDE Testing and Certification Institute
Master TRF:	Dated 2009-12
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If this Test Report Form is used by non Scheme procedure shall be removed.	-IECEE members, the IECEE/IEC logo and the reference to the CB
This report is not valid as a CB Test F appended to a CB Test Certificate iss	Report unless signed by an approved CB Testing Laboratory and ued by an NCB in accordance with IECEE 02.
Test item description	Digital RCD (ELCB) Tester
Trade Mark:	UNI-T
Manufacturer:	Same as applicant
Model/Type reference	UT582+
Ratings:	Measure: 230V 50Hz, CAT III 600V
	Powered: 6 x 1.5V LR6 AA battery

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Testi	ng procedure and testing location:		
Testing Laboratory:		Intertek Testing Services She	enzhen Ltd. Guangzhou Branch
Test	ing location/ address	Block E, No.7-2 Guang Don Road, Guangzhou Science (	g Software Science Park, Caipin City, GETDD, Guangzhou, China
	Associated CB Laboratory:		
Test	ing location/ address		
	Tested by (name + signature):	Bin Zhong / Engineer	
	Approved by (+ signature):	Justin He / Manager	
	Testing procedure: TMP		
	Tested by (name + signature):		
	Approved by (+ signature)		
Test	ing location/ address		
Testing procedure: WMT			
	Tested by (name + signature):		
	Witnessed by (+ signature):		
	Approved by (+ signature):		
Test	ing location/ address		
	Testing procedure: SMT		
	Tested by (name + signature):		
	Approved by (+ signature):		
	Supervised by (+ signature):		
Testing location/ address:			
	Testing procedure: RMT		
	Tested by (name + signature):		
	Approved by (+ signature):		
Supervised by (+ signature):			
Test	ing location/ address		



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#### List of Attachments (including a total number of pages in each attachment): None

Summary of testing:		
Tests performed (name of test and test clause):	Testing location:	
All applicable tests	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch	
	Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD, Guangzhou, China	
Summary of compliance with National Differences	5	
None		



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#### Copy of marking plate

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

1. Marking on front panel



2. Rear label

_	-				
Function	lerms	Measurement Unit	Display Range	Operating Error	
	Test Time	Millisecond	∆T=0ms-2000ms	±(2%+2LSD)	
RCD	Residual Operating Current	Milliampere	la 10mA/20mA/30mA 100mA/300mA/500mA	±10%	
VOLTS	Voltage Test	Volt	30V-600V	$\pm$ 3%rdg $\pm$ 3dgt	
Wiring Check     STOP if the wiring connection shows     incorrect on LCD. Disconnect from the     power source and check wiring.     WARNING A     TO AVOID ELECTRICAL SHOCK, REMOVE     TEST CORD BEFORE OPENING CASE.		IEC 610 IEC 610 IEC 610 IEC 615 CAT III 60 IEC 615 CAT III 60 IEC 615 CAT III 60 IEC 615 CAT III 60 IEC 610 IEC 610 I	010-1 010-2-030 010-2-033 057-1,-6 0V IP40 0V == LR6 ■ F2AH600V		

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Test item particulars	: (See IEC 61557-1 report 170920053GZU-002)
Classification of installation and use	Portable
Supply Connection	None
Type of item tested	Measurement
Description of equipment function	See general information
Model and/or type reference	UT582+
Serial number	: Not assigned
Rating(s)	:: Measure: 230V 50Hz, CAT III 600V
	Powered: 6 x 1.5V LR6 AA battery
Measurement (Installation) category	CAT III
Pollution degree	
Protection class	: Class II
Environmental rating	Standard: 0-40°C
Equipment mobility	: portable
Connection to mains supply	None
Operating conditions	: continuous
Overall size of the equipment (W x D x H)	160mmx70.5mmx100mm
Mass of the equipment (kg)	About 0.5kg
Marked degree of protection to IEC 60529	IP 40
Possible test case verdicts:	
- test case does not apply to the test object	: N/A
<ul> <li>test object does meet the requirement</li> </ul>	: P (Pass)
- test object does not meet the requirement.	: F (Fail)
Testing	
Date of receipt of test item	:: 20 Jan 2019
Date (s) of performance of tests	:: 21 Jan 2019 – 18 Feb 2019



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

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

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

Throughout this report a  $\Box$  comma /  $\boxtimes$  point is used as the decimal separator. When determining the test conclusion, the Measurement Uncertainty of test has been considered.

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The test report only allows to be revised only within the report defined retention period unless standard or regulation was withdrawn or invalid.

Manufacturer's Declaration per Sub-clause 6.2.5 of IECEE 02:				
The application for obtaining a CB Test Certificate in- cludes more than one factory location and a declara- tion from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided	Not applicable			
When differences exist; they shall be identified in the G	eneral Product Information section.			
Name and address of factory (ies): Same as applicant				
<b>General product information:</b> The measuring equipment is applied to testing of the effectiveness of protective measures by regular discon- pections of Residual Current protective Device (RCD) in TT. TN and TI systems. It calibrates based on closed-				

nections of Residual Current protective Device (RCD) in TT, TN and TI systems. It calibrates based on closedloop control system, the output current as a feedback. When the actual output current is different from the rated current, the device will adjust accordingly. AC current between live and ground line can be outputted accurately. And its trip time quickly captured by MCU.



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	TABLE: 1 - Test Report Index Page	
Document No.	Documents included / attached to this report (description)	Page Numbers
None		



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IEC 61557-6

Requirement — Test Clause

Result — Remark

Verdict

4	REQUIREMENTS		Р
	The following requirements as well as those given in IEC 61557-1 shall apply.		Р
4.1	Tests		Р
4.1.1	Tripping tests		Р
	The measuring equipment shall be capable of indi- cating that the residual operating current of the pro- tective device is less than or equal to the rated re- sidual operating current.		Р
	The tests shall be carried out with a sinusoidal, or mains-derived quasi sinusoidal test current.	Mains derived test current	Р
	The operating uncertainty of the calibrated test currents shall:		Р
	<ul> <li>not exceed 0 % to +10 % of the rated residual current with the rated residual operating current as fiducial value determined in accordance with Table 1.</li> </ul>		Ρ
	The operating uncertainty of measurement of the residual operating current shall:		Р
	<ul> <li>not exceed ±10 % of the rated residual operat- ing current as fiducial value determined in ac- cordance with Table 1.</li> </ul>		Р
	If the measuring equipment is provided for the pur- pose of testing residual current protective devices of 30 mA or below		Р
	<ul> <li>the ME-equipment shall be capable of providing a test of five times the rated residual operating current.</li> </ul>		Р
	<ul> <li>the test period shall be limited to 40 ms</li> </ul>	40 ms	Р
	When measuring the trip time, this limit of test peri- od need not be applied so long as the fault voltage remains below the touch voltage limit.		Р
	If the measuring equipment is capable of producing half-wave test currents, testing of residual current protective devices (RCDs) Type A:	Full wave test current	N/A
	<ul> <li>may alternatively be carried out using half-wave test currents according to the IEC 61008 and IEC 61009 series, IEC 60947-2 and IEC/TR 60755</li> </ul>		N/A
	<ul> <li>equipment shall be able to test in both polari- ties.</li> </ul>		N/A
4.1.2	Non-tripping tests		P
	When a test at 50 % or less of the rated residual operating current to test the reliability of the RCD is included:	At 50% rated residual operat- ing current	Р



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		IEC 61557-6		
Clause	Requirement — Test		Result — Remark	Verdict

	<ul> <li>minimum test period for general type RCDs shall be 0,3 s</li> </ul>	2000 ms	Р
	<ul> <li>minimum test period for type S RCDs shall be 0,5 s.</li> </ul>		Р
	The protective device shall not open.		Р
	When a no trip test at 50 % or less of the rated re- sidual operating current is included:		Р
	<ul> <li>the operating uncertainty of the calibrated test current shall not exceed 0 % to –10 % of the specified no tripping test current in accordance with Table 1</li> </ul>		Ρ
	NOTE If the purpose of the test is to evaluate other parameters (e.g. fault voltage) the minimum test period may be shorter but not less than one cycle of the rated frequency.		—
4.2	The measuring equipment shall be capable of indi- cating whether the fault voltage at the rated residual current of the protective device is less than or equal	There are two voltages for choose, which is UL50 and U25.	Р
	to the conventional touch voltage limit. The test may be carried out with or without a probe.	When choose UL50.It will show "Uf Hi". if fault voltage higher than 50 V	
		When choose UL25.It will show "Uf Hi". if fault voltage higher than 25 V	
	NOTE Indication can be by displaying the value of the fault volt- age or by the use of other clear indicators.		—
4.2.1	If a fault voltage is displayed or indicated for the re- sidual operating current and not for the rated resid- ual current,	Only indicate when fault volt- age higher than limits, no measurement value display	N/A
	<ul> <li>this shall be indicated in the display or</li> </ul>		N/A
	<ul> <li>shall be indicated on the measuring equipment or</li> </ul>		N/A
	$\begin{array}{ll} - & shall \ be \ calculated \ according \ to \ the \ formulae \\ U_F \leq U_L \ x \ ( \ I_\Delta \ / \ I_{\Delta n} \ ) \ where \\ U_L \ is \ the \ conventional \ touch \ voltage \ limit. \end{array}$		N/A
4.2.2	The operating uncertainty during the measurement of the fault voltage shall not exceed 0 % to +20 % with the conventional touch voltage limit as fiducial value, determined in accordance with Table 1.	Only indicate when fault volt- age higher than limits, no measurement value display	N/A
	NOTE The internal resistance of the voltage measuring equipment should be at least 0,7 k $\Omega$ /V of the full-scale value of the measurement range. The influence of the voltage measurement on the measurement of the fault current should be taken into consideration.		
4.3	The measuring equipment		Р
	<ul> <li>shall be capable of measuring the trip time of residual current protective devices at the rated residual operating current or</li> </ul>	Shows trip time	Р



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Clause	Requirement — Test	Result — Remark	Verdict

	<ul> <li>shall be capable of indicating the compliance with the maximum allowed trip time</li> </ul>		N/A
	When measuring the trip time, the operating uncer- tainty shall not exceed $\pm$ 10 % with the maximum permissible trip time as fiducial value and the influ- ence quantities according to Table 1.	See form A	Р
4.4	Measuring equipment with indicators the switching value of the indicators shall be the conventional true value for the calculation of uncertainties, provided nothing to the contrary is stated.		Р
4.5	The operating error applies under the rated operat- ing conditions stated in IEC 61557-1 and the follow- ing:		Р
	<ul> <li>the protective conductor is free from extraneous voltages;</li> </ul>		Р
	<ul> <li>the system voltage remains constant during the measurement;</li> </ul>		Р
	<ul> <li>the circuit following the residual current protec- tive device carries no leakage current;</li> </ul>		Р
	<ul> <li>the system voltage is within 85 % to 110 % of the nominal system voltage for which the equipment has been designed;</li> </ul>		Р
	<ul> <li>the resistance of the probes is within the limits stated by the manufacturer;</li> </ul>	Testing with probe attached Max 5 Ω	Р
	<ul> <li>– sinusoidal current.</li> </ul>		Р
4.6	When testing with the rated residual operating cur- rent, the following conditions shall be met:		Р
	<ul> <li>the current shall be switched on at a zero cross- ing;</li> </ul>		Р
	<ul> <li>the test period shall be limited to the maximum allowed trip time of the residual current protec- tive device under test. When measuring the trip time, these limits of the test periods need not be applied.;</li> </ul>		Р
4.7	Prevention of danger during measurements by fault voltages exceeding 50 V within the system under test shall be ensured. This can be achieved as follows:		Р
	<ul> <li>automatic disconnection in accordance with figure 1 of IEC 61010-1 when fault voltages with a magnitude &gt;50 V occur;</li> </ul>		N/A



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Clause	Requirement — Test	Result — Remark	Verdict

	<ul> <li>use of test resistances Rp adjustable in steps, or continuously, in such a manner that the test is started with a resistance that permits current of a maximum of 3,5 mA to flow when all paral- lel-connected circuits are included. An unam- biguous detection shall be ensured, for example by means of a voltmeter, as to whether this test resistance can be varied without producing a hazardous fault voltage.</li> </ul>	Monitor fault voltage by volt- age meter	Ρ
4.8	The user shall not be exposed to danger and the equipment shall not be damaged when the measuring equipment is connected to 120 % of the nominal voltage of the distribution system for which the measuring equipment has been designed. Protective devices shall not be activated.	See form J	Ρ
4.9	The user shall not be exposed to danger and the measuring equipment shall not be damaged when the measuring equipment is accidentally connected for 1 min with up to 173 % of its nominal voltage. Protective devices may be activated.	See form J	Р

5	MARKING AND OPERATING INSTRUCTIONS		Р
5.1	Marking		Р
	In addition to the marking in accordance with IEC 61557-1, the following information shall be provided on the measuring equipment.		Р
5.1.1	Rated residual operating current or rated residual operating currents of the operating protective devic- es for which the measuring equipment has been designed	See copy of marking	Р
5.2	Operating instructions		Р
	The operating instructions shall state the following information in addition to the statements specified in IEC 61557-1.		Р
5.2.1	Where the measuring circuit has no probe and if a possible voltage between the protective conductor and earth will influence the measurements, a warning must be included.		Р
5.2.2	Where the measuring circuit uses the N-conductor as a probe, a warning shall be given to test the connection between the neutral point of the distribu- tion system and earth before the test is started; a possible voltage between the N-conductor and the earth may influence the measurements.		Ρ
5.2.3	A warning that leakage currents in the circuit follow- ing the residual current protection device may influ- ence the measurements.		Р



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Clause	Requirement — Test		Result — Remark	Verdict

5.2.4	Where the fault voltage is indicated by the test equipment, a clear statement shall be given as to whether the voltage relates to the rated residual current or to the residual operating current of the protective device. If applicable, a note to fulfil the conditions of 4.2.1 shall also be included.	Ρ
5.2.5	The earth electrode resistance of a measuring cir- cuit with a probe shall not exceed a value to be stated by the manufacturer.	Р
5.2.6	A warning that the potential fields of other earthing installations may influence the measurement.	Р
5.2.7	A warning that special conditions in residual current protective devices of a particular design, for exam- ple of S-type (selective and resistance to impulse currents) shall be taken into consideration.	Р
5.2.8	A warning that equipment, which is connected downstream of a residual current	Р
	protective device (RCD) may cause a considerable extension of the operating time. Examples	
	of such equipment might be connected capacitors or running motors.	

6	TESTS	Р
	In addition to IEC 61557-1 the following tests shall be executed.	Р
	These tests shall be carried out at all rated residual operating currents and also, if applicable, at 50 % and 500 % of the rated residual operating current.	Р
	The test circuit shall be adapted to test both at the limits of the fault voltage for which the equipment is designed and also at the appropriate $R_A = R_{Amax}$ for each range.	Р
	The test circuit shall be adapted to each test meth- od employed. The manufacturer's data shall be heeded.	Р
	NOTE – $R_{Amax} = U_L / I_{\Delta n}$ where $U_L$ is the conventional touch voltage limit; $I_{\Delta n}$ is the rated residual operating current.	—
6.1	Operation uncertainty shall be determined in accordance with Table 1	Р
	In this process, the intrinsic uncertainties shall be determined under the following reference conditions:	Р
	<ul> <li>nominal voltage of the distribution system;</li> </ul>	Р
	<ul> <li>nominal frequency of the distribution system;</li> </ul>	Р
	<ul> <li>reference temperature 23 °C ± 2 °C;</li> </ul>	Р



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Clause	Requirement — Test		Result — Remark	Verdict

	<ul> <li>reference position in accordance with the man- ufacturer's statement;</li> </ul>		Р
	<ul> <li>protective conductor free from extraneous volt- ages;</li> </ul>		Р
	- 100 $\Omega$ resistance of the auxiliary earth electrode in a TT system.		Р
	The operating error thus evaluated shall not exceed the limits specified in 4.1 to 4.3.	see Forms A to H	Р
6.2	Compliance with the permissible operating error when measuring the fault voltage shall be tested for measurements with and without a probe.		Р
6.3	Compliance with the conditions for the internal re- sistance in accordance with 4.2 shall be tested in all measurement ranges (type test).	see Form I	Р
6.4	Compliance with the requirements under 4.6 and 4.7 shall be tested (routine test).	see Form J	Р
6.5	The overload protection in accordance with 4.8 and 4.9 shall be tested (type test).	see Form J	Р
6.6	Compliance with the tests in this clause shall be recorded.		Р



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Clause	Requirement – Test	Result – Remark	Verdict

6.1	TABLE: C	Operating e	error of Re	sidual (	Current De	evice mea	sureme	ents						Form A	Р
6.2	Operating	g error of c	onstant c	urrent											Р
	•	Intr	rinsic error						Influence of	1					
Range /	value	true	dis- played		Po	sition (E1)		Sup	oply voltage (	(E2)	Tem	perature (I	E3)	Comments	
		value mA	value mA	A	- 90 ° mA	+ 90 ° mA	E1	9.9V	7.2V	E2	0 °C mA	35 °C mA	E3		
X1/10mA		10	10.26	0.26	10.23	10.24	0.24	10.19mA	10.31 mA	0.31	10.24	10.27	0.27		
X1/20mA		20	20.53	0.53	20.52	20.55	0.55	20.46mA	20.55 mA	0.55	20.48	20.53	0.53		
X1/30mA		30	30.95	0.95	30.81	30.83	0.83	30.92mA	30.98 mA	0.98	30.92	31.04	1.04		
X1/100mA	X1/100mA 100 102.32 2.32 1				102.31	102.33	0.33	101.54 mA	102.78 mA	2.78	102.69	102.88	2.88		
X1/300mA		300	307.16	7.16	307.16	307.18	7.18	308.53 mA	309.32 mA	9.32	306.65	307.32	7.32		
X1/500mA		500	513.42	13.42	513.16	513.44	13.44	513.38 mA	513.52 mA	13.58	513.38	513.55	13.55		
Notes:															
Intrinsic err	ror or influence of	quantity		Referer specified	nce conditions of d operating rand	or De	Desi	gnation code	Requir with	rements or tes relevant parts	ts in accordance of IEC 61557	e		Type of test	
Intrinsic error			Reference co	nditions		J-		А	Part 6, 6.1			F	र		
Position			Reference po	sition ± 90°				E1	Part 1, 4.2			F	2		
Supply voltage			At the limits s	stated by the	e manufacturer			E <sub>2</sub>	Part 1, 4.2, 4.3			F	2		
Temperature			0 °C and 35 °	°C		2 – 2		E <sub>3</sub>	Part 1, 4.2			Т	Γ		
Operating error			$B = \pm ( A +1,1)$	I5 x √ (E1 <sup>∠</sup> +	$-E_{2}^{2}+E_{3}^{2}+E_{5}^{4}$	²+ E8²)		B	Part 6, 4.1, 4.2, 4	.3				<b>f</b> iele ( <b>a</b> l + <b>a</b> l + <b>a</b> l + <b>a</b> ) +	. 1000/
A = Intrinsic error		·	$E_n = variation$	IS			R = 10	buline lest	i = type test			E	8 [%] = ± ( B /	fiducial value )	x 100%
Supplementa	ry informati	ion:													

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Clause	Requirement – Test	Result – Remark		Verdict

6.1	TABLE: Operat	ing error o	of Residual Cu	urrent Device	e measure	ements				Form B	Р
6.2	Operating error	of consta	int current								Р
						Influence	of			Percer	apata
Ran	ne / Value		Resistance	e probes (E5)	I.			System voltage (E8)		opera	iting
		mA	mA	mA	E5	1	95V	253V	E8	error %	[B] '
X1/10mA		10.2	- 4	-	C	0.24	10.16 mA	10.19 mA	0.19		9.1%
X1/20mA		20.5	- 52	-	C	).52	20.38 mA	20.49 mA	0.49		9.4%
X1/30mA		30.8	- 22	-	C	.82	30.82 mA	30.88 mA	0.88		9.6%
X1/100mA		103.3	- 22	-	2	2.32	102.13 mA	102.36 mA	2.36		8.4%
X1/300mA		307.1	8 -	-	7	'.18 ÷	307.15 mA	307.86 mA	7.86		9.1%
X1/500mA		513.4	-2	-	13	3.42	513.25 mA	513.48 mA	13.48		9.6%
Notes:											
Intrinsic error or influence quantity Reference conditions or Designation code Requirements or tests in accordan with relevant parts of IEC 61557									nce 7	Type of test	
Intrinsic error			Reference condition	3		А	Part 3, 6.1	•		R	
Resistance of pro	obes and aux. earth electr	odes	0 to 100 x $R_A$ but $\leq 5$	0 kΩ		E₅	Part 5, 4.3			Т	
System voltage			85 % to 110 % of the	e nominal voltage		E8	Part 6, 4.3			Т	
Operating error			$B = \pm ( A +1, 15 \times \sqrt{6})$	$\Xi_1^2 + \Xi_2^2 + \Xi_3^2 + \Xi_5$	$b^{2} + E_{8}^{2}$ )	В	Part 6, 4.1, 4.2	2, 4.3			
A = intrinsic error			$E_n = variations$			R = routine test	T = type test		B [%] = ± ( B	/ fiducial value )	x 100%
Supplement	tary information:										

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	IEC 615	57-6		
Clause	Requirement – Test	Result – Remark		Verdict

6.1	TABLE:	Operating	error of R	esidual	Current D	evice mea	asurem	ents						Form C	Р
6.2	Operatin	g error of	fault volta	ge mea	surement	s									Р
		In	trinsic erro	r					Influence	of					
		true	displayed		P	osition (E1	)	Su	pply voltage	e (E2)	Ter	nperature	(E3)	_	
Range	e / value	value V	value V	A	- 90 ° V	+ 90 ° V	E1	7.2V	9.9V	E2	0 °C V	35 °C V	E3	Comm	nents
X1/30mA (	)°	•	•					•			•	•	•		
UL25		25.14	-	0.14	25.10	25.12	0.12	25.10V	25.12V	0.12	25.09	25.15	0.15		
UL50		50.43	-	0.43	50.42	50.43	0.43	50.32V	50.36V	0.36	50.34	50.45	0.45		
X1/30mA 1	180°			•			•								
UL25		25.14	-	0.14	25.12	25.15	0.15	25.11V	25.13V	0.13	25.09	25.16	0.16		
UL50		50.39	-	0.39	50.28	50.40	0.40	50.39V	50.40V	0.40	50.38	50.43	0.43		
Notes:															
Intrinsic	error or influenc	e quantity		Refe	rence conditions	s or Inde	De	signation code	Req	uirements or t	tests in accordar	nce 7		Type of test	
ntrinsic error			Reference c	onditions	<u></u>			А	Part 6, 6.1				R		
Position			Reference p	osition ± 9	0°			E1	Part 1, 4.2				R		
Supply voltage			At the limits	stated by t	he manufacture	r		E <sub>2</sub>	Part 1, 4.2, 4.3				R		
Temperature			0 °C and 35	°C				E <sub>3</sub>	Part 1, 4.2				Т		
Operating error			$B = \pm ( A +1)$	,15 x √ (E₁ <sup>2</sup>	$^{2}$ + E <sub>2</sub> <sup>2</sup> + E <sub>3</sub> <sup>2</sup> + E	5 <sup>2</sup> + E <sub>8</sub> <sup>2</sup> )		В	Part 6, 4.1, 4.2,	4.3					
A = intrinsic erro	or		En = variatio	ns			R =	routine test	T = type test				$B[\%] = \pm (B)$	/ fiducial value ) ×	< 100%

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Clause	Requirement – Test	Result – Remark		Verdict				

6.1	TABLE: Operat	ing error	of Residual Cu	urrent Devi	ce measu	rements					Form D	Р
6.2	Operating error	r of fault v	voltage measu	rements								Р
						Influence	of				Percer	ntage
Ran	ne / Value		Resistance	e probes (E	5)			System voltage (E8	3)		opera	iting
itan		5 Ω	V	V	E5	1	95V	253V	E	8	error %	[B]
X1/30mA 0	0				·			•				
UL25		25.09	-	-	0.09	25.12		25.14	0.14		1.9%	
UL50		50.26	-	-	0.26	50.40		50.42	0.42		2.9%	
X1/30mA 18	80°											
UL25		25.06	-	-	0.06	25.13		25.14	0.14		1.9%	
UL50		50.23	-	-	0.23	50.38		50.40	0.40		2.7%	
Notes:			•			•						
Intrins	ic error or influence quan	tity	Refere specifie	nce conditions of d operating rang	r e	Designation code	Re	equirements or tests in accord with relevant parts of IEC 615	lance 557		Type of test	
Intrinsic error			Reference conditions			A	Part 3, 6.1				R	
Resistance of pro	bes and aux. earth electr	odes	0 to 100 x $R_A$ but $\leq 5$	0 kΩ		E₅	Part 5, 4.3				Т	
System voltage			85 % to 110 % of the	nominal voltage		E8	Part 6, 4.3				Т	
Operating error			B = ± ( A +1,15 x √ (E	$E_1^2 + E_2^2 + E_3^2 + E_3^2$	$E_5^2 + E_8^2$ )	В	Part 6, 4.1, 4.1	2, 4.3				
A = intrinsic error			$E_n = variations$			R = routine test	T = type test			B [%] = ± ( B /	/ fiducial value ) >	x 100%
Supplement	ary information:											

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							IEC 6	1557-6							
Clause	Requiren	nent – Test						Result	– Remark						Verdict
	•							•							
6.1	TABLE:	Operating	error of R	esidual	Current D	evice mea	asureme	ents						Form E	Р
6.2	Operatin	g error of	tripping c	urrent n	neasurem	ents									Р
	•	Int	rinsic erro	or					Influence of	f					
Range	e / value	true	displayed		P	osition (E1	)	Su	pply voltage	(E2)	Ten	nperature (	(E3)	Comn	nents
		value	value	Α	- 90 °	+ 90 °	E1	9.9V	7.2V	E2	0°C	35 °C	E3		
		mA	mA	-	mA	mA		mA	mA	-	mA	mA	-		
X1/30mA		30.95	-	0.95	30.81	30.93	0.81	30.80	30.82	0.82	30.80	3.81	0.81		
Notes:				1				1		1			1		
Intrinsio	c error or influence	e quantity		Refere	ence conditions ed operating rar	or	Des	gnation code	Requi with	irements or te n relevant par	sts in accordan ts of IEC 61557	се		Type of test	
Intrinsic error			Reference co	onditions	1 0	0		А	Part 6, 6.1	1		ŀ	२		
Position			Reference p	osition ± 90	•			E1	Part 1, 4.2			F	२		
Supply voltage			At the limits	stated by th	e manufacturer			E <sub>2</sub>	Part 1, 4.2, 4.3			F	۲		
Temperature			0 °C and 35	°C				E <sub>3</sub>	Part 1, 4.2	-			Г		
Operating error	•		$B = \pm ( A +1)$	15 x √ (E₁²	$+ E_2^2 + E_3^2 + E_5^2$	5 <sup>2</sup> + E <sub>8</sub> <sup>2</sup> )		В	Part 6, 4.1, 4.2, 4	1.3					
A = intrinsic erro	or		En = variatio	ns			R = r	outine test	T = type test			E	3 [%] = ± ( B	/ fiducial value ) :	x 100%
Supplemer	ntary informa	tion:													

Clause Require	ement – 1 <b>:: Operat</b> i <b>ing error</b> le	Test ing error of trippin	of Residual ( ng current m	Current Devi easurement	ce measu	IEC 615	57-6 Result	– Remark					Verdict
Clause Require 6.1 TABLE: 6.2 Operati Range / Value X1/30mA	ement – 1 :: <b>Operat</b> i i <b>ng error</b> ie	rest ing error of trippin	of Residual ( ng current m	Current Devi easurement	ce measi	urement	Result	– Remark					Verdict
6.1 TABLE: 6.2 Operati Range / Value X1/30mA	: Operati ing error	ing error of trippi	of Residual ( ng current m	Current Devi easurement	ce meası	urement							
6.1 TABLE: 6.2 Operati Range / Value X1/30mA	ing error	ing error of trippin	of Residual (	Current Devi easurements	ce meası	urement							
6.2 Operati Range / Value X1/30mA	i <b>ng error</b> Ie	of trippi	ng current m	easurement			S					Form F	Р
Range / Value X1/30mA	e				5								Р
Range / Value X1/30mA	e					Infl	uence	of				Percen	itage
X1/30mA			Resistan	ce probes (E	5)				System voltage (I	Ξ8)		opera	ting
X1/30mA					E5	5	19	5.5V	253V		E8	error	[B]
X1/30mA		mA	mA	mA	-		r	nA	mA		-	%	
		30.82	-	-	0.82	30	).76		30.79	0.79		9.6%	
					_								
				_									
Notes:													
Intrinsic error or infl	fluence quant	tity	Refe speci	rence conditions of fied operating rang	r Je	Designat	tion code	Rec	quirements or tests in acc vith relevant parts of IEC 6	ordance 61557		Type of test	
Intrinsic error			Reference conditio	ns		ļ	4	Part 3, 6.1				R	
Resistance of probes and aux.	c. earth electro	odes	0 to 100 x $R_A$ but $\leq$	50 kΩ		E	5	Part 5, 4.3				Т	
System voltage			85 % to 110 % of t	ne nominal voltage	)	E	8	Part 6, 4.3				Т	
Operating error			B = ± ( A +1,15 x √	$(E_1^2 + E_2^2 + E_3^2 +  $	$E_5^2 + E_8^2$ )	E	3	Part 6, 4.1, 4.2	, 4.3				
A = intrinsic error			$E_n = variations$			R = routin	e test	T = type test			B [%] = ± ( B	/ fiducial value ) x	: 100%

IEC 61557-6           Clause         Requirement – Test         Result – Remark           Requirement – Test         Result – Remark           TABLE: Operating error of Residual Current Device measurements         Form C           International Current Device measurements         Form C           Colspan="4">Colspan="4"Colspan="4"	5GZU-003	No.: 19101314	Report				20 of 23	Page							
Clause       Requirement – Test       Result – Remark         Clause       Result – Remark         6.1       TABLE: Operating = ror of Residual Current Device measurements       Form Control         6.2       Operating error of trip time measurements       Influence of trip time measurements       Form Control       Form Control         Range / value       Influence of trip time measurements       Point (E1)       Supply voltage (E2)       Temperature (E3)       Operature (E3)       <							1557-6	IEC 6							
ABLE: Operating error of Residual Current Device measurements       Form C         6.2       Operating error of trip time measurements       Form C         Intrinsic error       Intrinsic error       Intrinsic error       Form C         Name       Intrinsic error       Intrinsic error       Form C       Supply voltage (E2)       Temperature (E3)       Com         Ange / value       A       -90 °       E1       9.90 °       C2       O"         Ange / value       N       -90 °       E1       9.90 °       TE1       Supply voltage (E2)       0"       Com         Ange / value       Na       ms       ms       ms       N         Ange / value       Value       N       NS       NS       NS       NS       TE       Com         Colspan="6">State       State       N <th< td=""><td>Ver</td><td></td><td></td><td></td><td></td><td>– Remark</td><td>Result</td><td></td><td></td><td></td><td></td><td></td><td>ent – Test</td><td>Requirem</td><td>Clause</td></th<>	Ver					– Remark	Result						ent – Test	Requirem	Clause
6.1       TABLE: Operating error of krip time measurements       Form C         6.2       Operating error of trip time measurements       Form C       Form C         Range / value       value       A      90 °       +.90 °       E1       9.9v       7.2V       E2       0 °C       35 °C       E3         0°       value       value       A      90 °       +.90 °       E1       9.9v       7.2V       E2       0 °C       35 °C       E3       Com         0°       value       value       A      90 °       F.90 °       E1       9.9v       7.2V       E2       0 °C       35 °C       E3       Com         0°       V       Mass       ·.90 °       E1       9.9v       7.2V       E2       0 °C       35 °C       E3       Com         0°       V       V       E2       0 °C       35 °C       E3       Com       Com       Com       Com       Com         X1/30mA       Z7.5       28       0.5       27.6       0.5       17.6       0.6       17.6       0.6       17.6       0.6       27.3       27.5       0.6       27.4							1								
6.2         Operating error of trip time measurements         Intrinsic error true         displayed         Position (E1)         Supply voltage (E2)         Temperature (E3)         Com           Range / value         Value         A         - 90°         + 90°         E1         9.9v         7.2V         E2         0°C         35 °C         E3           0°         ms         ms         ms         ms         -         ms         ms         %         ms         ms         -         Com           0°         X1/30mA         27.5         28         0.5         27.5         27.6         0.5         27.4         27.5         0.6         27.3         27.5         0.6           X5/30mA         27.3         28         0.7         27.4         27.4         0.6         27.2         27.3         0.8         27.4         27.5         0.6         27.4         27.5         0.6         27.4         27.5         0.6         27.4         27.5         0.6         27.4         27.5         0.6         27.4         27.5         0.6         27.4         27.5         0.6         27.4         27.5         0.6         27.4	m G I	Foi					nts	ureme	evice meas	Current D	esidual	error of Re	Operating of	TABLE: C	6.1
Intrinsic errorIntrinsic errorIntrinsic errorReference conditions or specified operating rangeInfluence ofSupply voltage (E2)Temperature (E3)ComPosition (E1)Supply voltage (E2)Temperature (E3)Com $value$ $value$ $A$ $-90^{\circ}$ $\pm 90^{\circ}$ $E1$ $9.9v$ $7.2V$ $E2$ $0^{\circ}$ $35^{\circ}$ C $E3$ $25^{\circ}$ $E3$ $0^{\circ}$ $1^{\circ}$ $1^{\circ$	ŀ									ments	easure	rip time m	g error of t	Operating	6.2
Notice in the physical interview in control (E1)Comparison of the physical (E2)Temperature (E2)Temperatu		=3)	perature (F	Tem	-2)	Influence of	Sur		osition (F1)	Pr		rinsic error	Int	/	6
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Comments	E3 (	35 °C	0°C	E2	7.2V	9.9v	E1	+ 90 °	- 90 °	Α	value	value	value	Range
0°       X1/30mA       27.5       28       0.5       27.5       27.6       0.5       27.4       27.5       0.6       27.3       27.5       0.7         X5/30mA       27.3       28       0.7       27.4       27.4       0.6       27.2       27.3       0.8       27.4       27.5       0.6         X5/30mA       27.3       28       0.7       27.4       27.4       0.6       27.2       27.3       0.8       27.4       27.5       0.6         180°       X1/30mA       17.6       18       0.4       17.5       -17.6       0.5       17.5       17.6       0.5       17.4       17.6       0.6         X5/30mA       17.4       18       0.6       17.6       17.6       0.4       17.4       17.6       0.6       17.5         X5/30mA       17.4       18       0.6       17.6       17.6       0.4       17.4       17.5       17.6       0.5       17.5         Notes:       Intrinsic error influence quantity       Reference conditions or specified operating range       Designation code       Requirements or tests in accordance with relevant parts of IEC 61557       Type of test         Intrinsic error       Reference position ± 90°       E <sub>1</sub> <td></td> <td>-</td> <td>ms</td> <td>ms</td> <td>%</td> <td>ms</td> <td>ms</td> <td>-</td> <td>ms</td> <td>ms</td> <td></td> <td>ms</td> <td>ms</td> <td></td> <td></td>		-	ms	ms	%	ms	ms	-	ms	ms		ms	ms		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$															0°
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		0.7	27.5	27.3	0.6	27.5	27.4	.5	27.6	27.5	0.5	28	27.5		X1/30mA
180°X1/30mA17.6180.417.5-17.60.517.517.60.517.417.60.6X5/30mA17.4180.617.617.60.417.417.50.617.517.60.5Notes:Intrinsic error or influence quantityReference conditions or specified operating rangeIntrinsic errorReference conditionsAPart 6, 6.1RPositionReference position ± 90°E1Part 1, 4.2RSupply voltageAt the limits stated by the manufacturerE2Part 1, 4.2RCoperating errorB = ± ( A +1,15 x \sqrt{(E_1^2+E_2^2+E_5^2+E_5^2)})BPart 6, 4.1, 4.2, 4.3T		0.6	27.5	27.4	0.8	27.3	27.2	.6	27.4	27.4	0.7	28	27.3		X5/30mA
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			L									•			180°
X5/30mA17.4180.617.617.60.417.417.50.617.517.60.5Notes:Intrinsic error or influence quantityReference conditions or specified operating rangeDesignation code with relevant parts of IEC 61557Type of test with relevant parts of IEC 61557Type of test sin accordance with relevant parts of IEC 61557Requirements or tests in accordance with relevant parts of IEC 61557Reference conditionsNotes:APart 6, 6.1Reference conditionsReference conditionsReference conditionsReference conditionsPositionReference position $\pm$ 90°E1Part 1, 4.2RSupply voltageAt the limits stated by the manufacturerE2Part 1, 4.2, 4.3RTemperature0 °C and 35 °CE3Part 1, 4.2TOperating errorB = $\pm$ ( A +1,15 x $\sqrt{(E_1^2 + E_2^2 + E_3^2 + E5^2 + E_8^2)}$ BPart 6, 4.1, 4.2, 4.3T		0.6	17.6	17.4	0.5	17.6	17.5	.5	-17.6	17.5	0.4	18	17.6		X1/30mA
Notes:Intrinsic error or influence quantityReference conditions or specified operating rangeDesignation code mith relevant parts of IEC 61557Type of testIntrinsic errorReference conditionsAPart 6, 6.1RPositionReference position $\pm 90^{\circ}$ E1Part 1, 4.2RSupply voltageAt the limits stated by the manufacturerE2Part 1, 4.2, 4.3RTemperature0 °C and 35 °CE3Part 1, 4.2TOperating errorB = $\pm ( A +1, 15 \times \sqrt{(E1^2 + E2^2 + E3^2 + E5^2 + E3^2)})$ BPart 6, 4.1, 4.2, 4.3T		0.5	17.6	17.5	0.6	17.5	17.4	.4	17.6	17.6	0.6	18	17.4		X5/30mA
Notes:Designation codeRequirements or tests in accordance with relevant parts of IEC 61557Type of testIntrinsic errorReference conditionsAPart 6, 6.1RPositionReference position $\pm 90^{\circ}$ E1Part 1, 4.2RSupply voltageAt the limits stated by the manufacturerE2Part 1, 4.2, 4.3RTemperature0 °C and 35 °CE3Part 1, 4.2TOperating errorB = $\pm ( A +1, 15 \times \sqrt{(E1^2 + E2^2 + E3^2 + E5^2 + E8^2)})$ BPart 6, 4.1, 4.2, 4.3T															
Notes:Designation codeRequirements or tests in accordance with relevant parts of IEC 61557Type of testIntrinsic errorReference conditionsAPart 6, 6.1RPositionReference position $\pm$ 90°E1Part 1, 4.2RSupply voltageAt the limits stated by the manufacturerE2Part 1, 4.2, 4.3RTemperature0 °C and 35 °CE3Part 1, 4.2TOperating errorB = $\pm$ ( A +1,15 x $\sqrt{(E_1^2 + E_2^2 + E_3^2 + E5^2 + E_8^2)}$ BPart 6, 4.1, 4.2, 4.3T															
Intrinsic error or influence quantityReference conditions or specified operating rangeDesignation code with relevant parts of IEC 61557Type of testIntrinsic errorReference conditionsAPart 6, 6.1RPositionReference position $\pm$ 90°E1Part 1, 4.2RSupply voltageAt the limits stated by the manufacturerE2Part 1, 4.2, 4.3RTemperature0 °C and 35 °CE3Part 1, 4.2TOperating errorB = $\pm$ ( A +1,15 x $\sqrt{(E_1^2 + E_2^2 + E_3^2 + E5^2 + E_8^2)}$ BPart 6, 4.1, 4.2, 4.3T															Notes:
Intrinsic errorReference conditionsAPart 6, 6.1RPositionReference position $\pm$ 90°E1Part 1, 4.2RSupply voltageAt the limits stated by the manufacturerE2Part 1, 4.2, 4.3RTemperature0°C and 35°CE3Part 1, 4.2TOperating errorB = $\pm$ ( A +1,15 x $\sqrt{(E_1^2 + E_2^2 + E_3^2 + E5^2 + E_8^2)}$ BPart 6, 4.1, 4.2, 4.3T	f test	Туре о	e	ts in accordanc of IEC 61557	ments or test elevant parts	Require with	gnation code	Desi	or ige	nce conditions d operating rar	Refere specifie		quantity	rror or influence	Intrinsic e
PositionReference position $\pm 90^{\circ}$ E1Part 1, 4.2RSupply voltageAt the limits stated by the manufacturerE2Part 1, 4.2, 4.3RTemperature0°C and 35°CE3Part 1, 4.2TOperating errorB = $\pm ( A +1,15 \times \sqrt{(E_1^2 + E_2^2 + E_3^2 + E5^2 + E_8^2)})$ BPart 6, 4.1, 4.2, 4.3T			R			Part 6, 6.1	А				onditions	Reference co			Intrinsic error
Supply voltageAt the limits stated by the manufacturer $E_2$ Part 1, 4.2, 4.3RTemperature0 °C and 35 °C $E_3$ Part 1, 4.2TOperating error $B = \pm ( A +1,15 \times \sqrt{(E_1^2 + E_2^2 + E_3^2 + E5^2 + E_8^2)})$ $B$ Part 6, 4.1, 4.2, 4.3T			R			Part 1, 4.2	E1			>	sition ± 90°	Reference po			Position
Temperature         0 °C and 35 °C         E3         Part 1, 4.2         T           Operating error         B = $\pm ( A +1,15 \times \sqrt{(E_1^2 + E_2^2 + E_3^2 + E5^2 + E_8^2)})$ B         Part 6, 4.1, 4.2, 4.3         T			R			Part 1, 4.2, 4.3	E <sub>2</sub>			e manufacturer	stated by the	At the limits s			Supply voltage
Operating error $ B = \pm ( A +1,15 \times \sqrt{(E_1^2 + E_2^2 + E_3^2 + E5^2 + E_8^2)})$ B  Part 6, 4.1, 4.2, 4.3			Т			Part 1, 4.2	E <sub>3</sub>				<u>'C</u>	0 °C and 35 °			Temperature
						Part 6, 4.1, 4.2, 4.3	В		<sup>2</sup> + E <sub>8</sub> <sup>2</sup> )	$+ E_2^2 + E_3^2 + E_5^2$	l5 x √ (E₁² -	B = ± ( A +1,1			Operating error
A = intrinsic error $E_n = variations$ R = routine testI = type testB [%] = ± (B / fiducial value)	/alue ) x 100%	$[\%] = \pm (B / fiducial)$	В			T = type test	utine test	R = rc			IS	$E_n = variation$			A = intrinsic error

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Clause	Requirement – Test	Result – Remark		Verdict				

6.1	TABLE: Operat	ting error	of Residual Cι	Irrent Dev	ice measu	rements					Form H	Р
6.2	Operating erro	r of trip ti	me measureme	ents								Р
						Influence	of				Doroo	otogo
Ran	ge / Value		Resistance	probes (E	5)			System voltage (E	8)		opera	ating
					E5	1	95V	253V		E8	error	[B]
		ms	ms	ms	-		ms	ms		-	%	)
0°						L			•			
X1/30mA		27.6	-	-	0.4	27.6		27.8	0.4		6.2%	
X5/30mA		27.3	-	-	0.7	27.8		27.8	0.2		8.1%	
180°								-				
X1/30mA		17.6	-	-	0.4	17.8		17.9	0.2		8.8%	
X5/30mA		17.5	-	-	0.5	17.7		17.8	0.3		8.7%	
Notes:			<b></b>									
Intrins	sic error or influence quar	ntity	Refere	nce conditions ( d operating ran	or ae	Designation code	Re	quirements or tests in acco with relevant parts of IEC 6	rdance 1557		I ype of test	
Intrinsic error			Reference conditions		3-	A	Part 3, 6.1				R	
Resistance of pro	obes and aux. earth elect	rodes	0 to 100 x $R_A$ but $\leq 50$	) kΩ		E₅	Part 5, 4.3				Т	
System voltage			85 % to 110 % of the	nominal voltage	e	E8	Part 6, 4.3				Т	
Operating error			B = ± ( A +1,15 x √ (E	$E_1^2 + E_2^2 + E_3^2 + E_3^2$	$E_5^2 + E_8^2$ )	В	Part 6, 4.1, 4.2	2, 4.3				
A = intrinsic error			$E_n = variations$			R = routine test	T = type test			B [%] = ± ( B /	fiducial value)	x 100%
Supplement	tary information:											



Clause

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IEC 61557-6 Requirement – Test Result - Remark

Verdict

6.3	TABLE: Inte	rnal Resistance		Form I	Р
	Range		<b>R</b> <sub>i</sub> [Ω]		Verdict
VOLTS		357.14k			Р
X1/2		333.3k			Р
X1		332.8k			Р
X5		334.5k			Р
AUTO RAMP		333.5k			Р
I					
Supplem	entary informatic	n:			

IEC 61557-6

Result – Remark

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Verdict

Requirement – Test Clause

6.5 TABLE: Overloa	d test													Form .I	P
	Value test voltage (NOTE 1)	Voltage measured		Transient (NOTE 2)		Current measured			Ca-	Protective					
Condition		V r.m.s	V peak	V d.c.	V	S	Test circuit A1/A2/A3	mA r.m.s.	mA peak	mA d.c.	tance μF	operating Y/N	Verdict	(NOTE 3)	
Instrument switched ON															
120 % U <sub>N</sub> dc (+)	-	-	-	-	-	-	-	-	-	-	-	-	-		
120 % U <sub>N</sub> dc (reverse polarity)	-	-	-	-	-	-	-	-	-	-	-	-	-		
120 % U <sub>N</sub> ac	276	32.57	45.89	-	-		-	-	-	-	-	-	Р		
173 % U <sub>N</sub> ac	398	41.32	56.38	-	-		A1	0.0301	0.0547	-	-	-	Р		
Instrument switched OFF				•			•								
120 % U <sub>N</sub> dc (+)	-	-	-	-	-	-	-	-	-	-	-	-	-		
120 % $U_N$ dc (reverse polarity)	-	-	-	-	-	-	-	-	-	-	-	-	-		
120 % U <sub>N</sub> ac	-	-	-	-	-	-	-	-	-	-	-	-	-		
173 % U <sub>N</sub> ac	-	-	-	-	-	-	-	-	-	-	-	-	-		
NOTE 1 – Indicate subclause of part 6 NOTE 2 – Value of test voltage is base NOTE 3 – Transient voltages must be	requirements d on U <sub>N</sub> 120 % below the limits	(Subcl. 4.8 given from	5) and 173 Figure 1 a	% (Subo and the c	:l. 4.6) apacitance	below tł	ne limits fro	m figure 2	of IEC 610 <sup>-</sup>	10-1.					
Supplementary information:															