



Report No:	2012-J04025
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# Test Report

Sample's Name:	Single Phase Energy Meter
Model/Specification:	DDSD101 230V 5(100)A 50Hz
Entrusting Company:	Wasion Group Limited.China
Manufacturer:	Wasion Group Limited.China
Tested category:	Entrusted test

Testing institution: Hunan Institute of Metrology and Test .China




# Hunan Institute of Metrology and Test

## Test report

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Sample's name	Single Phase Energy Meter	Model/ Specification	DDSD101 230V 5(100)A 50Hz
Entrusting company	Wasion Group Limited.China	Brand	Wasion
Accuracy	Active Power:±1%	Tested category	Entrusted test
Manufacturer	Wasion Group Limited.China	Sample amount	3
Test date	April 17 ,2012- July 10,2012	Serial No	No: 20120302037 No: 20120302029 No: 20120302011
Test location	Hunan Institute of Metrology and Test	Tester	李华 陈国军
Product status	Good		
Test standards	IEC 62053-21:2003 Electricity metering equipment(a.c.)-Particular requirements -Part 21:Static meters for active energy(classes 1 and 2) IEC 62052-11:2003 Electricity metering equipment(a.c.)-General requirements, tests and test conditions-Part 11:Metering equipment		
Test items	See page3.		
Test result	<p style="text-align: center;">Based on the standard IEC 62053-21, IEC 62052-11, the sample is examined.</p> <p style="text-align: center;">The test result: Qualified.</p> <div style="text-align: right; margin-top: 20px;">               Date of Issue: Sep 27. 2012         </div>		
Remarks	/		

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Approved By: 李国军

Main standard measuring instruments	Name	Specification	Serial No:	Certificate No:
	Three-phase watt-hour meter testing device	YC-1893(II)	3201014	2012020700105
	Impulse voltage testing equipment	XTS-11A	20013	2012020700069
	Pressure Tester	CJ2671E	040	2012020700100
	Over-current testing equipment	XTS-12	0211	2012020700072
	Magnetic field testing equipment	ZCZ-01	00016	2012020700078
	Temperature sensor	WP-D806	1355A	TW 2012-0068
	High-temperature and humid test Chamber	HRT405PB	112023	2012040302421
	EFT/B Simulator	EFT500N	V1038107374	XDdj2011-0745
	Surge Simulator	TRA2000-SURGE-DIP CDN2000-04-32	439	XDdj2011-0662
	RF Generator	NSG2070	1130	XDdj2012-0822
	Electromagnetic radiation analyzer	EMR-200, TYPE 8.3	2244/21AM-00 372244/90.20A N-0061	XDdj2012-0806
	GTEM Cell	NIM-8815	201	XDdj2009-10366
	EMI Test Receiver	PMM9010	143WJ70602	XDdj2012-1663
	ESD Simulator	ESD 30N/P 30N	V1038107375	XDdj2011-0746
	Anechoic Chamber	9m×6m×6m	/	XDdj2009-4154
	EMI Test Receiver	ESU26	100177	XDdj2010-3030
	Hybrid Log Periodic Antenna	HL562	100453	XDdj2010-3031
	Spring hammer	TYZ	HBS0.22	LScj2011-0109
	Shock tester	CC-1	030911	LScj2012-0080
Vibration tester	DC-1500-16	100201	FV2012-0005	
Glow wire tester	ZHZ-13	2106	201202030052	
Remarks: All standard measuring instruments used in the test can be traced back to national standards.				

	<b>Requirement</b>	<b>Result</b>
Test items	1. Marking of the meter	Pass
	2. Test of starting and no-load condition	Pass
	2.1 Initial start-up of the meter	Pass
	2.2 Test of no-load condition	Pass
	2.3 Starting test	Pass
	3. Meter constant	Pass
	4. Accuracy requirements	Pass
	4.1 Limits of error due to variation of the current	Pass
	4.2 Limits of error due to variation of the voltage	Pass
	4.3 Limits of error due to variation of the frequency	Pass
	4.4 Limits of error due to variation of the ambient temperature	Pass
	4.5 Accuracy test in the presence of harmonics	Pass
	4.6 Test of the influence of odd harmonics and sub-harmonics	Pass
	4.7 Test of the influence of d.c. and even harmonics	Pass
	4.8 Test of the influence of odd harmonics and sub-harmonics	Pass
	4.9 Variation due to continuous magnetic induction of external origin	Pass
	4.10 Variation due to magnetic induction of external origin 0.5 mT	Pass
	5. Electrical requirements	Pass
	5.1 Power consumption	Pass
	5.2 Influence of short-time over-currents	Pass
	5.3 Temperature arise test	Pass
	5.4 Influence of self-heating	Pass
	5.5 Voltage dips and short interruptions	Pass
	6. Insulation	Pass
	6.1 Impulse voltage test	Pass
	6.2 A.C. voltage test	Pass
	7. Electromagnetic compatibility(EMC)	Pass
	7.1 Test of immunity to the electrostatic discharges	Pass
	7.2 Test of immunity to electromagnetic RF fields	Pass
	7.3 Fast transient burst test	Pass

	<b>Requirement</b>	<b>Result</b>
Test items	7.4 Test of immunity to conducted disturbances, induced by radio-frequency fields	Pass
	7.5 Surge immunity test	Pass
	7.6 Radio interference suppression	Pass
	8.Climatic conditions	Pass
	8.1 Dry heat test	Pass
	8.2 Cold test	Pass
	8.3 Damp hest cyclic test	Pass
	9 Mechanical test	Pass
	9.1 Vibriation test	Pass
	9.2 Shock test	Pass
	9.3 Spring hammer test	Pass
	9.4 Protection against penetration of dust	Pass
	9.5 Protection against penetration of water	Pass
	9.6 Resistance to heat and fire	Pass

## Test Result

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### 1. Marking

Test item	Requirement	Test result		
		2037	2011	2029
Case	The meter shall have a case which can be sealed in such a way that the internal parts of the meter are accessible only after breaking the seal(s). The cover shall not be removable without the use of a tool.	Pass	Pass	Pass
Terminals – Terminal block(s) – Protective earth terminal	Terminals may be grouped in (a) terminal block(s) having adequate insulating properties and mechanical strength. The manner of fixing the conductors to the terminals shall ensure adequate and durable contact such that there is no risk of loosening or undue heating.	Pass	Pass	Pass
Terminal cover(s)	The terminals of a meter, if grouped in a terminal block and if not protected by any other means, shall have a separate cover which can be sealed independently of the meter cover. The terminal cover shall enclose the actual terminals, the conductor fixing screws and, unless otherwise specified, a suitable length of the external conductors and their insulation.	Pass	Pass	Pass
Insulating encased meter of protective class II	A meter of protective class II shall have a durable and substantially continuous enclosure made wholly of insulating material, including the terminal cover.	Pass	Pass	Pass
Display of measured values	The information can be shown either by an electromechanical register or an electronic display. In the case of an electronic display the corresponding non-volatile memory shall have a minimum retention time of four months. It shall be impossible to reset the indication of the cumulative total of electrical energy during use.	Pass	Pass	Pass
Output device	The meter shall have a test output device capable of being monitored with suitable testing equipment.	Pass	Pass	Pass

Test item	Requirement	Test result		
		2037	2011	2029
Name plates	<p>Transducers shall bear on(or visible through)one of external surface of the case,the markings listed below.</p> <p>a)Manufacturer's name or trade mark and, if required, the place of manufacture;</p> <p>b)Designation of type;</p> <p>c)The number of phases and the number of wires for which the meter is suitable (for example, single-phase 2-wire, three-phase 3-wire, three-phase 4-wire); these markings may be replaced by the graphical symbols given in IEC 60387;</p> <p>d)The serial number and year of manufacture. If the serial number is marked on a plate fixed to the cover, the number shall also be marked on the meter base or stored in the meter's non-volatile memory;</p> <p>e) The reference voltage in one of the following forms:          -the number of elements if more than one, and the voltage at the meter terminals of the voltage circuit(s);          -the rated voltage of the system or the secondary voltage of the instrument transformer to which the meter is intended to be connected.</p> <p>f) For direct connected meters, the basic current and the maximum current expressed,for transformer-operated meters, the rated secondary current of the transformer(s) to which the meter should be connected,; the rated current and the maximum current of the meter may be included in the type designation;</p> <p>g) The reference frequency in Hz;</p> <p>h) The meter constant;</p> <p>i) The class index of the meter;</p> <p>j) The reference temperature if different from 23 °C;</p> <p>k) The sign of the double square □ for insulating encased meters of protective class II.</p>	Pass	Pass	Pass
Connection diagrams and terminal marking	<p>Every meter shall preferably be indelibly marked with a diagram of connections. If this is not possible reference shall be made to a connection diagram. For polyphase meters, this diagram shall also show the phase sequence for which the meter is intended. It is permissible to indicate the connection diagram by an identification figure in accordance with national standards.</p> <p>If the meter terminals are marked, this marking shall appear on the diagram.</p>	Pass	Pass	Pass

Test conclusion :Pass

2. Test of starting and no-load condition

2.1 Initial start-up of the meter

Voltage : 230V 50Hz 22°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
Initial start-up	The meter shall be functional within 5 s after the reference voltage is applied to the meter terminals.	Pass	Pass	Pass

Test conclusion:Pass

2.2 Test of no-load condition

Voltage : 230V 50Hz 22°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
Test of no-load condition	When the voltage is applied with no current flowing in the meter shall not produce more than one pulse. For this test, the current circuit shall be open-circuit and a voltage of 115% of reference voltage shall be applied to the voltage circuits.	Pass	Pass	Pass

Test conclusion:Pass

2.3 Starting

Voltage : 230V Current: 5(100)A 50Hz 22°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
Starting	The meter shall start and continue to register at the starting current values (0.4% $I_b$ ) and in case of polyphase meters, with balanced load.	Pass	Pass	Pass

Test conclusion:Pass

3. Meter constant

Voltage : 230V Current: 5(100)A 50Hz 22°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
Meter constant	The relation between the test output and the indication in the display shall comply with the marking on the name-plate.	Pass	Pass	Pass

Test conclusion:Pass



## 4.Accuracy requirements

## 4.1 Limits of error due to variation of the current

Voltage : 230V Current: 5(100)A 50Hz 22°C 60% RH

Current (I/ I <sub>b</sub> )%	Factor (cos φ )	Limits error (%)	Relative error (%)			Test result
			2037	2011	2029	
2000	1.0	±1.0	-0.0	-0.0	-0.0	Pass
1600		±1.0	-0.0	-0.0	-0.0	Pass
1200		±1.0	-0.0	-0.0	-0.0	Pass
800		±1.0	-0.0	-0.0	+0.0	Pass
400		±1.0	-0.0	+0.0	+0.0	Pass
200		±1.0	-0.0	+0.0	+0.0	Pass
100		±1.0	-0.0	+0.0	+0.0	Pass
50		±1.0	+0.0	+0.0	-0.0	Pass
10		±1.0	-0.0	+0.2	-0.2	Pass
5		±1.5	+0.0	+0.4	-0.4	Pass
2000		0.5L	±1.0	-0.1	-0.1	+0.0
1600	±1.0		-0.1	-0.1	+0.1	Pass
1200	±1.0		-0.1	-0.1	+0.1	Pass
800	±1.0		-0.0	-0.0	+0.1	Pass
400	±1.0		+0.0	+0.0	+0.1	Pass
200	±1.0		-0.0	+0.0	+0.1	Pass
100	±1.0		+0.0	+0.0	+0.1	Pass
50	±1.0		+0.0	+0.1	+0.1	Pass
20	±1.0		-0.0	+0.2	-0.1	Pass
10	±1.5		+0.0	+0.4	-0.2	Pass
2000	0.8C		±1.0	-0.0	-0.0	-0.1
1600		±1.0	-0.0	-0.0	-0.0	Pass
1200		±1.0	-0.0	-0.0	-0.0	Pass
800		±1.0	-0.0	-0.0	-0.0	Pass
400		±1.0	+0.0	+0.0	-0.0	Pass
200		±1.0	+0.0	+0.0	-0.0	Pass
100		±1.0	+0.0	+0.0	-0.0	Pass
50		±1.0	+0.0	+0.0	-0.0	Pass
20		±1.0	+0.0	+0.1	-0.1	Pass
10		±1.5	+0.0	+0.3	-0.2	Pass

Test conclusion:Pass

4.2 Limits of error due to variation of the voltage

Voltage : 230V Current: 5(100)A 50Hz 22°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
Limits of error due to variation of the voltage	As the voltage vary from 90 % to 110% reference voltage ,the change of relative error should be less than 0.7%. current:5% $I_b$ ; factor:1.0;freq:50Hz	0.04%	0.03%	0.06%
	As the voltage vary from 90 % to 110% reference voltage ,the change of relative error should be less than 0.7%. current: $I_{max}$ ; factor:1.0 ;freq:50Hz	0.03%	0.02%	0.00%
	As the voltage vary from 90 % to 110% reference voltage ,the change of relative error should be less than 1.0%. current:100% $I_b$ ; factor:0.5L; freq:50Hz	0.01%	0.02%	0.02%

Test conclusion:Pass

4.3 Limits of error due to variation of the frequency

Voltage : 230V Current: 5(100)A 50Hz 22°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
Limits of error due to variation of the frequency	As the frequency vary from 98 % to 102% ,the change of relative error should be less than 0.5%. current:5% $I_b$ ; factor:1.0;reference voltage.	0.03%	0.04%	0.06%
	As the frequency vary from 98 % to 102% ,the change of relative error should be less than 0.5%. current: $I_{max}$ ; factor:1.0 ; reference voltage.	0.04%	0.01%	0.03%
	As the frequency vary from 98 % to 102% ,the change of relative error should be less than 0.7%. current:100% $I_b$ ; factor:0.5L; reference voltage.	0.01%	0.02%	0.02%

Test conclusion:Pass

4.4 Limits of error due to variation of the ambient temperature

Voltage : 230V Current: 5(100)A 50Hz

Test item	Requirement		Test result		
			2037	2037	2037
Limits of error due to variation of the ambient temperature	As the temperature vary from -10°C ~45°C, power factor:1.0;the change of relative limits of variation in percentage error should be less than 0.05%/°C.	I <sub>max</sub>	0.006%/°C	0.006%/°C	0.013%/°C
		I <sub>b</sub>	0.008%/°C	0.006%/°C	0.006%/°C
		0.05I <sub>b</sub>	0.007%/°C	0.008%/°C	0.010%/°C
	As the temperature vary from -10°C ~45°C, power factor:0.5L ;the change of relative limits of variation in percentage error should be less than 0.07%/°C.	I <sub>max</sub>	0.005%/°C	0.004%/°C	0.011%/°C
		I <sub>b</sub>	0.005%/°C	0.006%/°C	0.007%/°C
		0.1I <sub>b</sub>	0.005%/°C	0.008%/°C	0.008%/°C

Test conclusion:Pass

4.5 Accuracy test in the presence of harmonics

Voltage : 230V Current: 5(100)A 50Hz 22°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
Accuracy test in the presence of harmonics	Fundamental frequency current: $I_1=0.5 I_{max}$ ;fundamental frequency voltage: $U_1=U_n$ ; fundamental frequency power factor:1; content of 5th harmonic voltage: $U_5=10\%U_n$ ; content of 5th harmonic current: $I_5=40\%$ of fundamental current ; harmonic power factor: 1; fundamental and harmonic voltages are in phase, at positive zero. The variation of relative error should be less than 0.8%.	0.04%	0.03%	0.01%

Test conclusion:Pass

4.6 Test of the influence of d.c. and even harmonics

Voltage : 230V Current: 5(100)A 50Hz 22°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
Test of the influence of d.c. and even harmonics	Fundamental frequency current: $I_1=0.707 I_{max}$ ;fundamental frequency voltage: $U_1=U_n$ ; fundamental frequency power factor:1; The variation of relative error should be less than 3.0%.	0.03%	0.04%	0.04%

Test conclusion:Pass

4.7 Test of the influence of odd harmonics

Voltage : 230V Current: 5(100)A 50Hz 22°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
Test of the influence of odd harmonics	Fundamental frequency current: $I_1=0.5 I_b$ ;fundamental frequency voltage: $U_1=U_n$ ; fundamental frequency power factor:1; The variation of relative error should be less than 3.0%.	0.04%	0.03%	0.05%

Test conclusion:Pass

4.8 Test of the influence of sub-harmonics

Voltage : 230V Current: 5(100)A 50Hz 22°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
Test of the influence of sub-harmonics	Fundamental frequency current: $I_1=0.5 I_b$ ;fundamental frequency voltage: $U_1=U_n$ ; fundamental frequency power factor:1; The variation of relative error should be less than 3.0%.	0.01%	0.03%	0.02%

Test conclusion:Pass

4.9 Variation due to continuous magnetic induction of external origin

Voltage : 230V Current: 5(100)A 50Hz 22°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
Variation due to continuous magnetic induction of external origin	Current:100% $I_b$ ; factor:1.0; reference voltage.The continuous magnetic induction may be obtained by using the electromagnet, energized with a d.c. current. This magnetic field shall be applied to all accessible surfaces of the meter when it is mounted as for normal use. The value of the magneto-motive force applied shall be 1 000 At (ampere-turns). The variation of relative error should be less than 2.0%.	0.02%	0.00%	0.01%

Test conclusion:Pass

4.10 Variation due to magnetic induction of external origin 0.5 mT

Voltage : 230V Current: 5(100)A 50Hz 22°C 60% RH

Test item	Requirement	Test result			
		2037	2011	2029	
Variation due to magnetic induction of external origin 0.5 mT	Current:100% $I_b$ ; factor:1.0; reference voltage. A magnetic induction of external origin of 0,5 mT produced by a current of the same frequency as that of the voltage applied to the meter and under the most unfavourable conditions of phase and direction , The variation of relative error should be less than 2.0%.	Vertical	0.12%	0.09%	0.09%
		Horizo- -ntal	0.14%	0.13%	0.14%

Test conclusion:Pass

5.Electrical requirements

5.1 Power consumption

Voltage : 230V Current: 5(100)A 50Hz 23°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
Power consumption	The active and apparent power consumption in each voltage circuit of a meter at reference voltage, shall not exceed: 2W/10VA.	1.02W/ 8.52VA	1.03W/ 8.57VA	1.03W/ 8.64VA
	The apparent power taken by each current circuit of a meter at basic current, shall not exceed : 4VA.	0.18VA	0.18VA	0.19VA

Test conclusion:Pass

5.2 Influence of short-time overcurrents test

Voltage : 230V Current: 5(100)A 50Hz 23°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
Influence of short-time overcurrents test	The meter shall be able to carry a short –time overcurrent of 30 $I_{max}$ with a relative tolerance of +0%~-10% for one half-cycle at rate frequency. Short-time overcurrent shall not damage the meter, the meter shall performed correctly when back to its initial working condition and the variation of error shall not exceed 1.5%	0.01%	0.02%	0.03%

Test conclusion:Pass

5.3 Temperature arise test

Voltage : 230V Current: 5(100)A 50Hz

Test item	Requirement	Test result		
		2037	2011	2029
Temperature arise test	With each current of the meter carrying rated maximum current and with each voltage circuit carrying 1,15 times the reference voltage, the temperature rise of the external surface shall not exceed 25K,with an ambient temperature of 40°C.	2.5K	2..2K	2.2K

Test conclusion:Pass

5.4 Test of self-heating influence

Voltage : 230V Current: 5(100)A 50Hz 23°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
Test of self-heating influence	After the voltage circuits have been energized at reference voltage for at least 2h,without any current in the current circuits, the maximum current shall be applied to the current circuits. Factor :1.0, the variation of error shall not exceed 0.7%	0.05%	0.05%	0.05%
	After the voltage circuits have been energized at reference voltage for at least 2h,without any current in the current circuits, the maximum current shall be applied to the current circuits. Factor :0.5L, the variation of error shall not exceed 1.0%	0.08%	0.09%	0.04%

Test conclusion:Pass

## 5.5. Voltage dips and short interruptions

Voltage : 230V Current: 5(100)A 50Hz 23°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
Voltage dips and short interruptions	<p>- voltage and auxiliary circuits energized with reference voltage; -without any current in the current circuits.</p> <p>a) voltage interruptions of <math>\Delta U = 100\%</math>            - interruption time: 1 s;            . number of interruptions: 3;            . restoring time between interruptions: 50 ms</p> <p>Voltage dips and short interruptions shall not produce a change in the register of more than 0.023kWh and the test output shall not produce a signal equivalent of more than 0.023kWh.</p>	Pass	Pass	Pass
	<p>- voltage and auxiliary circuits energized with reference voltage; -without any current in the current circuits.</p> <p>b) voltage interruptions of <math>\Delta U = 100\%</math>            . interruption time: one cycle at rated frequency;            . number of interruptions: 1.</p> <p>Voltage dips and short interruptions shall not produce a change in the register of more than 0.023kWh and the test output shall not produce a signal equivalent of more than 0.023kWh.</p>	Pass	Pass	Pass
	<p>- voltage and auxiliary circuits energized with reference voltage; -without any current in the current circuits.</p> <p>c) voltage dips of <math>\Delta U = 50\%</math>            . dip time: 1 min;            . number of dips: 1.</p> <p>Voltage dips and short interruptions shall not produce a change in the register of more than 0.023kWh and the test output shall not produce a signal equivalent of more than 0.023kWh.</p>	Pass	Pass	Pass

Test conclusion:Pass

6. Insulation

6.1 Impulse voltage test

Voltage : 230V Current: 5(100)A 50Hz 23°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
Impulse voltage test	Circuit relative to earth -Extent value:6kV no flashover or breakdown occurred during test	Pass	Pass	Pass

Test conclusion:Pass

6.2. A.C. voltage test

Voltage : 230V Current: 5(100)A 50Hz 23°C 60% RH

Test item	Requirement	Test result		
		2037	2011	2029
A.C. voltage test	Circuit relative to earth -Extent value:4kV -Time :1 min no flashover or breakdown occurred during test	Pass	Pass	Pass

Test conclusion:Pass

7. Electromagnetic compatibility(EMC)

7.1 Test of immunity to the electrostatic discharges

Voltage : 230V Current: 5(100)A 50Hz 22°C 56% RH

Test item	Requirement	Test result		
		2037	2011	2029
Test of immunity to the electrostatic discharges	Meter in operating condition: -voltage and auxiliary circuits energized with reference voltage. -without any current in the current circuit; -contact discharge; -test voltage:8kV; -number of discharges:10 -if contact discharge is not applicable because no metallic parts are outside,then apply qir discharge with a 15 kV test voltage; After the test: 1. Working normal, information no change, 2. Count variety $\leq 0.023kWh$	Pass	Pass	Pass

Test conclusion:Pass



7.2 Test of immunity to electromagnetic RF fields

Voltage : 230V Current: 5(100)A 50Hz 22°C 56% RH

Test item	Requirement	Test result		
		2037	2011	2029
Test of immunity to electromagnetic RF fields	a)Test with current meter in operating condition: -voltage and auxiliary circuits energized with reference voltage. -basic current $I_b$ , rated current $I_n$ -factor:1.0 -unmodulated test field strength:10V/m During the test: 1. Working normal, information no change, 2. The variation of error shall not exceed 2.0%	Pass	Pass	Pass
	b)Test without any current meter in operating condition: -voltage and auxiliary circuits energized with reference voltage. -without any current and the current terminals shall be open circuit -unmodulated test field strength:30V/m During the test: 1. Working normal, information no change, 2. Count variety $\leq 0.023kWh$	Pass	Pass	Pass

Test conclusion:Pass

7.3Fast transient burst test

Voltage : 230V Current: 5(100)A 50Hz 22°C 56% RH

Test item	Requirement	Test result		
		2037	2011	2029
Fast transient burst test	Meter in operating condition: -voltage and auxiliary circuits energized with reference voltage. -test voltage on the voltage circuit:4 kV -duration of the test:60s at each polarity. During the test: 1. Working normal, information no change, 2. Count variety $\leq 0.023kWh$	Pass	Pass	Pass

Test conclusion:Pass

7.4 Test of immunity to conducted disturbances, induced by radio-frequency fields

Voltage : 230V Current: 5(100)A 50Hz 22°C 56% RH

Test item	Requirement	Test result		
		2037	2011	2029
Test of immunity to conducted disturbances, induced by radio-frequency fields	a)Test with current meter in operating condition: -voltage and auxiliary circuits energized with reference voltage. -basic current $I_b$ . rated current $I_n$ -factor:1.0 -frequency:150 kHz~80MHz -voltage:10 V During the test: 1. the behaviour of the equipment shall not be perturbed, 2. The variation of error shall not exceed 2.0%	Pass	Pass	Pass
	b)Test without any current meter in operating condition: -voltage and auxiliary circuits energized with reference voltage. -without any current and the current terminals shall be open circuit -frequency:150 kHz~80MHz -voltage:10 V During the test: 1. the behaviour of the equipment shall not be perturbed, 2. Count variety $\leq 0.023kWh$	Pass	Pass	Pass

Test conclusion:Pass

7.5 Surge immunity test

Voltage : 230V Current: 5(100)A 50Hz 22°C 56% RH

Test item	Requirement	Test result		
		2037	2011	2029
Surge immunity test	Meter in operating condition: -voltage and auxiliary circuits energized with reference voltage. -without any current in the current circuits and the current terminals shall be open circuit -test voltage on the current and voltage circuits(main lines):4kV,generator source impedance:2 $\Omega$ -number of test:5 positive and negative The application of the surge immunity test voltage shall not produce a change in the register of more than 0.023kWh and the test output shall not produce a signal equivalent to more than 0.023kWh.	Pass	Pass	Pass

Test conclusion:Pass

7.6 Radio interference suppression

Voltage : 230V Current: 5(100)A 50Hz 22°C 56% RH

Test item	Requirement	Test result		
		2037	2011	2029
Radio interference suppression	meter in operating condition: -voltage and auxiliary circuits energized with reference voltage. -with a current between $0,1I_b$ and $0,2 I_b$ resp. $0,1I_n$ and $0,2 I_n$ -frequency:0.15MHz~1GHz During the test: The equipment shall not produce conduct noise that disturbed other equipment.	Pass	Pass	Pass

Test conclusion:Pass

8.Climatic conditions

8.1 Dry heat test

Test item	Requirement	Test result		
		2037	2011	2029
Dry heat test	meter in non-operating condition: -temperature: $+70^{\circ}\text{C} \pm 2^{\circ}\text{C}$ -duration of the test:72h After the test, the meter shall show no damage or change of information and shall operate correctly.	Pass	Pass	Pass

Test conclusion:Pass

8.2 Cold test

Test item	Requirement	Test result		
		2037	2011	2029
Cold test	meter in non-operating condition: -temperature: $-25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ -duration of the test:72h After the test, the meter shall show no damage or change of information and shall operate correctly.	Pass	Pass	Pass

Test conclusion:Pass

8.3 Damp hest cyclic test

Test item	Requirement	Test result		
		2037	2011	2029
Damp hest cyclic test	-voltage and auxiliary circuits energized with reference voltage. -without any current in the current circuits -variant:1 -upper temperature: $+40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ -no special precautions shall be taken regarding the removal of surface moisture; -duration of the test:6 cycles After the test, the meter shall show no damage or change of information and shall operate correctly.	Pass	Pass	Pass

Test conclusion:Pass

9 Mechanical test

9.1 Vibriation test

22°C 56% RH

Test item	Requirement	Test result		
		2037	2011	2029
Vibriation test	meter in non-operating condition, without the packing: -frequency range:10Hz~150Hz -transition frequency:60Hz - $f < 60\text{Hz}$ , constant amplitude of movement 0.075mm; - $f > 60\text{Hz}$ , constant acceleration $9.8\text{m/s}^2$ -single point control; -number of sweep cycles per axis:10 After the test, the meter shall show no damage or change of information and shall operate correctly.	Pass	Pass	Pass

Test conclusion:Pass

9.2 Shock test

22°C 56% RH

Test item	Requirement	Test result		
		2037	2011	2029
Shock test	meter in non-operating condition, without the packing; -half-sine pulse; -peak acceleration: $300\text{ m/s}^2$ -duration of the pulse:18ms After the test, the meter shall show no damage or change of information and shall operate correctly.	Pass	Pass	Pass

Test conclusion:Pass

## 9.3 Spring hammer test

22°C 56% RH

Test item	Requirement	Test result		
		2037	2011	2029
Spring hammer test	<p>The meter shall be mounted in its normal working position and the spring hammer shall act on the outer surface of the meter cover(including windows) and on the terminal cover with a kinetic energy of <math>0.2J \pm 0.02J</math>.</p> <p>The result of the test is satisfactory if the meter case and terminal cover do not sustain damage which could affect the function of the meter and if it is not possible to touch live parts.</p>	Pass	Pass	Pass

Test conclusion:Pass

## 9.4 Protection against penetration of dust

23°C 55% RH

Test item	Requirement	Test result		
		2037	2011	2029
Protection against penetration of dust	<p>meter in non-operating condition,</p> <ul style="list-style-type: none"> <li>-the test should be conducted with sample length of cable(exposed ends sealed) of the types specified by the manufacture and terminal cover in place;</li> <li>-for indoor meters only, the same atmospheric pressure is maintained inside the meter as outside(neither under-nor over-pressure);</li> <li>-first characteristic digit:5(IP5X)</li> </ul> <p>Any ingress of dust shall be only in a quantity not impairing operation of the meter. An insulation test should be passed.</p>	Pass	Pass	Pass

Test conclusion:Pass

## 9.5 Protection against penetration of water

23°C 55% RH

Test item	Requirement	Test result		
		2037	2011	2029
Protection against penetration of water	<p>meter in non-operating condition,</p> <ul style="list-style-type: none"> <li>-second characteristic digit:1(IP51)for indoor meters;</li> </ul> <p>Any ingress of water shall be only in a quantity not impairing the operation of the meter. An insulation test should be passed.</p>	Pass	Pass	Pass

Test conclusion:Pass

9.6 Resistance to heat and fire

Test item	Requirement	Test result		
		2037	2011	2029
Resistance to heat and fire	The test shall be carried out with following temperatures: -terminal block: $960^{\circ}\text{C}\pm 15^{\circ}\text{C}$ -terminal cover and meter case: $650^{\circ}\text{C}\pm 10^{\circ}\text{C}$ -duration of application: $30\text{s}\pm 1\text{s}$ The terminal block, the terminal cover and the meter case shall ensure reasonable safety against spread of fire. They should be ignited by thermal overload of live parts in contact with them.	Pass	Pass	Pass

Test conclusion:Pass