Type evaluation report

Issued by : NMi Certin B.V., accredited by the national accreditation body (RvA), based on the ISO/IEC 17025, with identification number L029. RvA is signatory member of both the Multi-Lateral Agreement of the European cooperation for Accreditation (EA) and the Mutual Recognition Arrangement of the International Laboratory Accreditation Cooperation (ILAC).

Applicant : Landis+Gyr AG
Theilerstrasse 1
CH 6301 Zug
Switzerland

Measuring instrument : **A poly phase static watthourmeter**

Manufacturer : Landis+Gyr
Type : (E650) ZMD/ZFD400...S4
(S650) SMA/SFA400...S4

Test specifications :
- IEC 62052-11
  "Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment"
- IEC 62053-21
  "Electricity metering equipment (AC) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2)"
- IEC 62053-22
  "Electricity metering equipment (AC) - Particular requirements - Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)"
- EN 50470-1
  "Electricity metering equipment (a.c.) - General requirements, tests and test conditions - Part 1: Metering equipment (class indexes A, B
- EN 50470-3
  "Electricity metering equipment (a.c.) - Particular requirements - Part 3: Static meters for active energy (class indexes A, B and C)"

Testing period : June up to and including August 2017

Issue date : 22 August 2017

Performed by: Reviewed by:

Информацията е заличена съгл. чл. 45 и чл. 59, ал. 1 от ЗЗЛД

Approvals Expert | Senior Approvals Expert

ВЯРНО С ОРИГИНАЛА

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Tests : The meters as specified in annex 2 were tested for compliance with the standards as specified on page 1 of this type evaluation report. The performed tests are stated in annex 1. If applicable specific test conditions are stated at each test.

Results : See annex 1 of this type evaluation report. The meter fulfils the general requirements of the IEC 62052-11, and the requirements for class 1 of the IEC 62053-21 and the requirements for class 0,2 S of the IEC 62053-22 for all performed tests.

The meter fulfils the general requirements of the EN 50470-1 [2006], and the requirements for class C of the EN 50470-3 [2006] for all performed tests.

Based on the compliance with the EN 50470 documents NMi presumes conformity with the Measuring Instrument Directive (MID). The investigation has resulted in a class C EU-type examination certificate nr. T11132 revision 0.

Traceability : The measurements have been executed using standards for which the traceability to (inter)national standards has been demonstrated towards the RvA.

Uncertainty : The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, which provides a confidence level of approximately 95%.
The total uncertainty of the measurements of the error of indication is 0,06% for power factor=1, and 0,10% for power factor=0,5 inductive or power factor=0,8 capacitive.
The total uncertainty in the measurements of power is 0,02 W.

Annexes : The complete type evaluation report consists of the following annexes:

annex 1 : performed tests
annex 2 : characteristics of the tested meters
annex 3 : checklist of general requirements
annex 4 : test data

Remark : The test data as presented in the annex 4 of this type evaluation report is performed under RvA accreditation with reference number L029, in which conformity to ISO/IEC 17025 has been demonstrated.
The data as presented in the annexes 1, 2 and 3 gives extra information.

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Доклад за оценка на типа

Издаден от : NMi Сертин Б.В., акредитирана от националния орган по акредитация (RvA), въз основа на ISO / IEC 17025, с идентификационен номер L029. RvA е член, подписал както Многостранното споразумение за европейско сътрудничество за акредитация (ЕА), така и споразумението за взаимно признаване на международното сътрудничество за акредитация на лабораториите (ILAC).

Заявител : Ландис+Гир АГ
Тейлерщрасе 1
CH 6301 Цуг
Швейцария

Измервателен уред : **Многофазен статичен електромер**

Производител : Ландис+Гир
Тип : (E650)
ZMD/ZFD400...S4
(S650)
SMA/SFA400...S4

Спецификации на теста :
- IEC 62052-11
" Оборудване за измерване на електроенергия (AC) - Общи изисквания, изпитвания и условия за изпитване - Част 11: Измервателно оборудване "
- IEC 62053-21
"Оборудване за измерване на електроенергия (AC) - Специфични изисквания. Част 21: Статични измервателни уреди за активна енергия (класове 1 и 2)
- IEC 62053-22
"Оборудване за измерване на електроенергия (AC) - Специфични изисквания. Част 22: Статични измерватели за активна енергия (класове 0,2 S и 0,5 S)"
- EN 50470-1
"Оборудване за измерване на електроенергия (а.с.). - Общи изисквания, изпитвания и условия за изпитване. - Част 1: Измервателно оборудване (класови показатели A, B) "
- EN 50470-3
"Оборудване за измерване на електроенергия (а.с.) - Специфични изисквания - Част 3: Статични измервателни прибори за активна енергия (класови показатели A, B и C)"

Тестови период : Юни до и вкл. Август 2017

Дата на издаване : 22 Август 2017

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Извършен от: Проверен от:

Информацията е заличена съгл. чл. 45 и чл. 59, ал. 1 от ЗЗЛД

Експерт проверител Старши експерт проверител

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Този документ се издава съгласно условията, за не поемане на отговорност...

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Номер на доклад NMi-1901209-01
Страница 2 от 2

Тестове : Измервателните уреди, посочени в приложение 2, са тествани за съответствие със стандартите, посочени на страница 1 от този доклад за оценка на типа. Извършените изпитвания са посочени в приложение 1. Ако е приложимо, при всяко изпитване се посочват конкретни условия за изпитване.

Резултати : Вж. Приложение 1 към този доклад за оценка на типа. Измервателният уред отговаря на общите изисквания на IEC 62052-11 и изискванията за клас 1 на IEC 62053-21 и изискванията за клас 0,2 S на IEC 62053-22 за всички проведени изпитвания.

Измервателният уред отговаря на общите изисквания на EN 50470-1 [2006] и на изискванията за клас C на EN 50470-3 [2006] за всички проведени изпитвания.

Въз основа на съответствието с документите EN 50470 NMi предполага съответствие с Директивата за измервателните уреди (MID). В резултат на изследването беше издаден сертификат за ЕС изследване на типа клас № T11132 ревизия 0.

Проследимост : Измерванията са извършени с използване на стандарти, за които проследимостта по международните и национални стандарти е доказана спрямо RvA.

Непределеност : Отчетената несигурност се основава на стандартна неопределеност, умножена с коефициент на покритие k = 2, който осигурява ниво на доверие от приблизително 95%.
Общата неопределеност на измерванията на грешката на индикацията е 0,15% за фактор на мощност = 1 и 0,20% за фактор на мощност = 0,5 индуктивен или фактор на мощността = 0,8 капацитивен. Общата несигурност в измерванията на мощността е 0,02 W.

Приложения : Пълният доклад за оценка на типа се състои от следните приложения:

приложение 1: проведени тестове
приложение 2: характеристики на тестваните електромери
приложение 3: списък с общи изисквания
приложение 4: тестови данни

Забележки : Данните от изпитванията, представени в приложение 4 към този доклад за оценка на типа, се извършват съгласно RvA акредитация с референтен номер L029, в която е доказано съответствие с ISO / IEC 17025.
Данните, представени в приложения 1, 2 и 3, предоставят допълнителна информация.

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Annex 1: Performed tests

In the following tables the performed tests are indicated with the accompanying results, as well as the page number of the appertaining annex where the results are presented.

Particular requirements of the IEC 62053-21 / EN 50470-3:

article IEC 62053-21 / IEC 62053-22 / EN 50470-3	tests:	passed	not applicable	not performed	annex 4 page
8.1 8.1 / 8.1	error due to variation of current (at reference conditions)	√			1
8.18.1 / 8.1	error due to variation of current (single phase load)	√			4
8.3 8.3 / 8.7.9	starting- and no-load condition	√			8
8.48.4 / 8.7.10	meter constant	√			10
8.2 8.2 / 8	variation of the error due to variation of the voltage	√			11
8.2 8.2 / 8	variation of the error due to variation of the frequency	√			13
8.2 8.2 / 8.5	reversed phase sequence	√			14
8.2 8.2 / 8.5	voltage unbalance	√			15
8.28.2 / 8.5	operation of accessories	√			16
8.2 8.2 / -	variation of the error due to variation of the temperature	√			17
8.2 8.2 / 8.5	variation of the error due to harmonics	√			18
8.2 8.2 / 8.5	continuous magnetic induction of external origin	√			19
8.2 8.2 / 8.5	magnetic induction of external origin (0,5 mT)	√			20
7.1 7.1 / 7.1	power consumption	√			21
7.27.2 / 8.6	variation of the error due to short-time overcurrents			√*	-
7.37.3 / 8.5	variation of the error due to self-heating	√			22
7.3.37.3.3 / 7.2	AC voltage test			√*	-

General requirements of the IEC 62052-11 / EN 50470-1:

article IEC 62052-11 / EN 50470-1	tests:	passed	not applicable	not performed	annex 4 page
7.3.2 / 7.3	impulse voltage test			√*	-
7.4 / -	earth fault	√			23
7.5.2 / 7.4.5	immunity to electrostatic discharges			√*	-
7.5.3 / 7.4.6	immunity to electromagnetic RF-fields			√*	-
7.5.4 / 7.4.7	fast transient bursts			√*	-
7.5.5 / 7.4.8	immunity to conducted disturbances			√*	-
7.5.6 / 7.4.9	surge immunity			√*	-
7.5.7 / 7.4.10	damped oscillatory waves immunity			√*	-
7.5.8 / 7.4.13	radio interference suppression			√*	-
7.1.2 / 7.4.4	influence of supply voltage	√			24
7.2 / 7.2	influence of heating	√			25
6.3.1, 6.3.2, 6.3.3	dry heat test, cold test and damp heat, cyclic test	√			26
6.3.4	solar radiation		√		-
5.2.2.2, 5.2.2.3	shock and vibration tests			√*	-
5.2.2.1	spring hammer test	√			27
5.9	protection against dust and water			√*	-
5.8	test of resistance to heat and fire	√			27

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Extra requirements for the EN 50470-3:

article EN 50470-3	tests:	passed	not applicable	not performed	annex 4 page
8.1	accuracy tests at reference conditions	√			28
8.2	repeatability	√			31
8.3	variation of the error due to variation of the voltage	√			34
8.3	variation of the error due to variation of the frequency	√			38
8.3	variation of the error due to variation of the temperature	√			41
8.4	maximum permissible error	√			47
8.5	earth fault	√			23

Other tests:

	tests:	passed	not applicable	not performed	annex 4 page
TR 50579	disturbance with harmonics in the frequency range 2-150 kHz	√			53
WELMEC 11	one phase export, remaining phases import	√			54

Remark: The measurements are performed at a reference temperature of 23±2 °C, unless an other temperature is stated.

The tests for resistance to heat and fire, double insulation and the spring hammer test are performed at the TÜV Rheinland EPS BV laboratory in Leek, the Netherlands.

*) For the tests which are not performed, as indicated in annex 1, a reference can be made to further investigations with the ZxD/SxDxxx S4 meter, as presented in the test report no. E2307-05b1-17, E2307-21-17, E2307-22-17 and E2307-23-17, issued by Quinel and no. 17-IK-0126.S02 and 17-IK-0028.U01, issued by Electrosuisse. The results of these tests can be applied also for the ZxD/SxDxxx S4 meter.

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Annex 2: Characteristics of the tested watthour meters

Sample number	Model	Serial number	Year of fabrication	I_{min} [A]	I_n [A]	I_{max} [A]	U_{ref} [V]	f_{ref} [Hz]	Meter constant [imp./kWh]
1.1.	ZMD405CT	38607953	2017	0,01	1	10	3x58/100 ... 3x240/415	50	10.000
1.2.	ZMD405CT	38607954	2017	0,01	1	10	3x58/100 ... 3x240/415	50	10.000
1.3.	ZMD405CT	38607955	2017	0,01	1	10	3x58/100 ... 3x240/415	50	10.000
1.4.	ZMD405CT	38607956	2017	0,01	1	10	3x58/100 ... 3x240/415	50	10.000
1.5.	ZMD405CT	40024362	2017	0,01	1	10	3x58/100 ... 3x240/415	50	5.000
1.6.	ZMD405CT	40024363	2017	0,01	1	10	3x58/100 ... 3x240/415	50	5.000
1.7	ZMD405CT	40 115 104	2017	0,01	1	10	3x58/100 ... 3x240/415	50	10.000
1.8	ZMD405CT	40 115 110	2017	0,01	1	10	3x58/100 ... 3x240/415	60	5.000
1.9	ZMD405CT	40 115 109	2017	0,01	1	10	3x58/100 ... 3x240/415	60	5.000
2.1.	ZFD405CT	40024359	2017	0,01	1	10	3x58/100 ... 3x240/415	50	5.000
2.2.	ZFD405CT	40024364	2017	0,01	1	10	3x58/100 ... 3x240/415	50	5.000
2.3.	ZFD405CT	40024360	2017	0,01	1	10	3x58/100 ... 3x240/415	50	5.000
2.4.	ZFD405CT	40024361	2017	0,01	1	10	3x58/100 ... 3x240/415	50	5.000
3.1.	ZMD405CT	38607957	2017	0,05	5	20	3x58/100 ... 3x240/415	50	5.000
3.2.	ZMD405CT	38607958	2017	0,05	5	20	3x58/100 ... 3x240/415	50	5.000
3.3.	ZMD405CT	38607959	2017	0,05	5	20	3x58/100 ... 3x240/415	50	5.000
3.4.	ZMD405CT	38607960	2017	0,05	5	20	3x58/100 ... 3x240/415	50	5.000
5.1	ZMD402CT	40 024 356	2017	-	0,3	1,2	3x58/100 ... 3x240/415	50	50.000
5.2	ZMD402CT	40 115 108	2017	-	0,3	1,2	3x58/100 ... 3x240/415	50	50.000
5.3	ZMD402CT	40 115 107	2017	-	0,3	1,2	3x58/100 ... 3x240/415	50	50.000

IEC accuracy class: B or C (EN); 1 or 0,5 S or 0,2 S (IEC)
Software version: B40 Checksum: 0xDA22
Hardware version: S4

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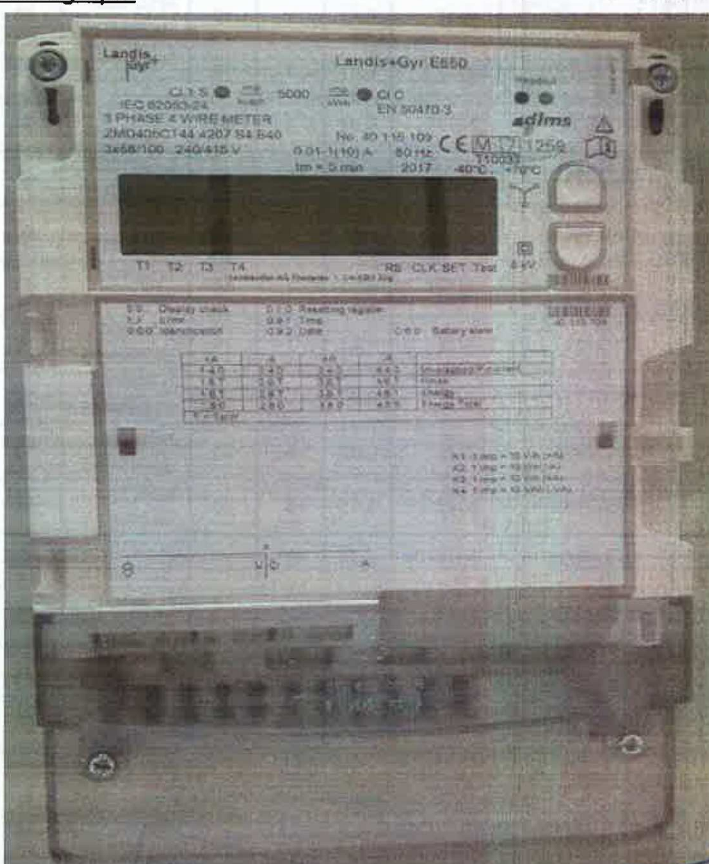
Remarks: The results as mentioned in this type evaluation report relate only to the meters which are tested.

The above mentioned characteristics were stated on the watthour meters under test and are required by the IEC documents.
However, according to the Annex V of the MID and the EN 50470 documents, other parameters are used to define the meter characteristics. Therefore in addition the following characteristics are used during the investigation:

- I_{tr} : $0{,}05 * I_n$
- I_{min} : $0{,}2 * I_{tr}$ $(= 0{,}01 * I_n)$
- I_{st} : $0{,}02 * I_{tr}$ $(= 0{,}001 * I_n)$

Several tests are performed to show compliance with both the IEC documents and EN 50470 documents, as indicated in Annex 1. For those tests mainly the terminology as indicated in the IEC documents is used. The above mentioned values for I_{tr}, I_{min} and I_{st} can be used for a cross reference between the two different kind of terminologies.

Photograph:



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Annex 3: Checklist of general requirements

General requirements standard IEC 62052-11:

article	requirement	passed (yes/no)	not applicable
4.1 - 4.3	the meter must have a 'standard' value for voltage, current and frequency.	yes	
5.1	the meters shall be designed in such a way to avoid any danger, for electric shocks, excessive temperatures, fire and penetration of dust and water.	yes	
5.2.1	internal parts may only be accessible after breaking a seal.	yes	
	the cover may only be removed by use of a tool.	yes	
	non-permanent deformation may not influence the meter.	yes	
	meters with a reference voltage > 250V shall and whose case is wholly or partilly made of metal, shall be provided with a protected earth terminal.		n.a
5.3	the registers must be observed clearly.	yes	
5.4	requirements for terminals	yes	
	the material of the terminal block has passed the tests given in ISO 75 for a temperature of 135°C and a pressure of 1,8 MPa (Method A).	yes*)	
5.5	the terminal cover shall be sealed independently.	yes	
5.6	see requirements for clearance / creepage distances	yes	
5.7	meters of protective class II shall be sufficient isolated (see requirements).	yes	
5.10	presentation of measured energy must be clearly by a mechanical/electronical register, containing sufficient elements for 1500 hours running at I_{max}, while the indication is in kWh	yes	
	the active tariff shall be indicated, the identification of each tariff applied shall be possible and, for automatic sequencing displays, each display shall be retained for a minimum of 5 s.	yes	
	at interruption of the tension the indication must be recovered within a period of at least 4 months,	yes	
5.11	the meter shall have a test output.	yes	
5.11.1	the maximum pulse frequency shall not exceed 2,5 kHz, the pulse transition time shall not exceed 20 μs.	yes	
5.11.2	the wavelength is between 550 nm and 1000 nm.	yes	
5.12.1	all necessary markings shall be put onto the meter.	yes	
5.12.2	the meter is marked with a connection diagram	yes	

*) The judgement is performed based on documents delivered by the applicant.

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General requirements standard EN 50470-1:

article	requirement	passed (yes/no)	not applicable
4.1 - 4.3	the meter must have a 'standard' value for voltage, current and frequency.	yes	
5.1	the meters shall be designed in such a way to avoid any danger, for electric shocks, excessive temperatures, fire and penetration of dust and water.	yes	
5.2.1	internal parts may only be accessible after breaking a seal.	yes	
	the cover may only be removed by use of a tool.	yes	
	non-permanent deformation may not influence the meter.	yes	
5.3	the registers must be observed clearly.	yes	
5.4	requirements for terminals	yes	
	the material of the terminal block has passed the tests given in ISO 75 for a temperature of 135°C and a pressure of 1,8 MPa (Method A).	yes*)	
5.5	the terminal cover shall be sealed independently.	yes	
5.6	see requirements for clearance / creepage distances	yes	
5.7	meters of protective class II shall be sufficient isolated (see requirements).	yes	
5.10	presentation of measured energy must be clearly by a mechanical/electronical register, containing sufficient elements for 4000 hours running at I_{max}, while the indication is in kWh or MWh	yes	
	the active tariff shall be indicated, the identification of each tariff applied shall be possible and, for automatic sequencing displays, each display shall be retained for a minimum of 5 s.	yes	
	for testing purposes it shall be possible to increase the resolution to 0,01 times the principal unit	yes	
	at interruption of the tension the indication must be recovered within a period of at least 4 months.	yes	
5.11	the meter shall have a test output.	yes	
5.11.1	the maximum pulse frequency shall not exceed 2,5 kHz, the pulse transition time shall not exceed 20 µs.	yes	
5.11.2	the wavelength is between 550 nm and 1000 nm.	yes	
5.12.1	all necessary markings shall be put onto the meter.	yes	
5.12.2	the meter is marked with a connection diagram	yes	
5.13	for each meter type, an instruction manual shall be made available including the stated information	yes	

*) The judgement is performed based on documents delivered by the applicant.

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General requirements standard EN 50470-3:

article	requirement	passed (yes/no)	not applicable
9	durability the meter shall be designed to maintain an adequate stability of its metrological characteristics over a period estimated by the manufacturer.	yes*)	
10	reliability the meter shall be designed to operate reliable.	yes**)	
11	the functions implemented in software shall be unambiguously identified and their operation adequately documented by the manufacturer	yes	
	software identification shall be easily provided.	yes	
	corruption of metrologically relevant software shall be easily detected.	yes	
	metrologically relevant parameters shall be identified and protected against accidental or intentional changes after placing the legal seals.	yes	
	evidence of any intervention shall be available for a reasonable time.	yes	
	if there are parameters, which are allowed to be set in the field, this shall be possible only under adequate protection, using the specified method; any admissible changes of such parameters shall be properly traceable.	yes	
	the security system of the meter shall be adequately documented.	yes	
	non-relevant functions in the software shall not influence the correct operation of the metrologically relevant software.	yes	

*) The judgement is performed based on documents delivered by the applicant.

**) The judgement is performed based on documents delivered by the applicant.

Requirements WELMEC 11:

article	requirement	passed (yes/no)	not applicable
	The cumulative register is protected by means of a hardware seal.	yes	
	If no cumulative register is available, the registers from which the total quant supplied can be derived, are protected by means of a hardware seal.		n.a
	If the effect of different phase sequences is **NOT** negligible, the meter shall bear information in respect of phase sequence to be applied.		n.a

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Annex 4: Test data

Test: Error due to variation of the current (at reference conditions)

The error of the meters is measured under reference conditions at different values of the current and power factor.

Results: **Balanced load:**

I [%] of I_n	Error [%] Import 3x230/400V					
	Sample nr. 1.1			Sample nr. 1.2		
	cos(f)=1	cos(f)=0,5 ind.	cos(f)=0,8 cap.	cos(f)=1	cos(f)=0,5 ind.	cos(f)=0,8 cap.
1	+ 0,1			+ 0,1		
2	+ 0,0	+ 0,1	+ 0,0	+ 0,0	+ 0,1	+ 0,0
5	+ 0,0	+ 0,1	+ 0,0	+ 0,0	+ 0,1	+ 0,0
10	+ 0,0	+ 0,1	+ 0,0	+ 0,0	+ 0,1	+ 0,0
20	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0
50	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0
100	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0
0,5·Imax	+ 0,0	– 0,1	+ 0,0	+ 0,0	– 0,0	+ 0,0
Imax	+ 0,0	– 0,1	+ 0,0	+ 0,0	– 0,1	+ 0,0

I [%] of I_n	Error [%] Export 3x230/400V					
	Sample nr. 1.1			Sample nr. 1.2		
	cos(f)=1	cos(f)=0,5 ind.	cos(f)=0,8 cap.	cos(f)=1	cos(f)=0,5 ind.	cos(f)=0,8 cap.
1	– 0,0			– 0,0		
2	– 0,0	+ 0,0	– 0,0	+ 0,0	+ 0,0	– 0,0
5	+ 0,0	+ 0,0	– 0,0	+ 0,0	+ 0,0	– 0,0
10	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0
20	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0
50	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0
100	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0
0,5·Imax	+ 0,0	– 0,1	+ 0,0	+ 0,0	– 0,0	+ 0,0
Imax	+ 0,0	– 0,1	+ 0,0	+ 0,0	– 0,1	+ 0,0

I [%] of I_n	Error [%] Import 3x230/400V					
	Sample nr. 2.1			Sample nr. 2.2		
	cos(f)=1	cos(f)=0,5 ind.	cos(f)=0,8 cap.	cos(f)=1	cos(f)=0,5 ind.	cos(f)=0,8 cap.
1	+ 0,0			+ 0,1		
2	+ 0,0	+ 0,1	+ 0,0	+ 0,0	+ 0,0	+ 0,0
5	+ 0,0	+ 0,1	– 0,0	– 0,0	– 0,0	+ 0,0
10	+ 0,0	+ 0,1	– 0,0	– 0,0	– 0,1	+ 0,0
20	+ 0,0	+ 0,1	– 0,0	– 0,0	– 0,1	+ 0,0
50	+ 0,0	+ 0,1	– 0,0	– 0,0	– 0,1	+ 0,0
100	+ 0,0	+ 0,1	+ 0,0	– 0,0	– 0,1	+ 0,0
0,5·Imax	+ 0,0	+ 0,0	+ 0,0	– 0,0	– 0,1	+ 0,0
Imax	+ 0,0	+ 0,0	+ 0,0	– 0,0	– 0,1	+ 0,0

Информацията е заличена съгл. чл. 45 и чл. 59, ал. 1 от ЗЗЛД

I [%] of I_n	Error [%] Export 3x230/400V					
	Sample nr. 2.1			Sample nr. 2.2		
	cos(f)=1	cos(f)=0,5 ind.	cos(f)=0,8 cap.	cos(f)=1	cos(f)=0,5 ind.	cos(f)=0,8 cap.
1	– 0,0			– 0,0		
2	– 0,0	+ 0,0	– 0,1	– 0,0	– 0,1	– 0,0
5	+ 0,0	+ 0,0	– 0,0	– 0,0	– 0,1	– 0,0
10	+ 0,0	+ 0,1	– 0,0	– 0,0	– 0,1	+ 0,0
20	+ 0,0	+ 0,1	– 0,0	– 0,0	– 0,1	+ 0,0
50	+ 0,0	+ 0,1	– 0,0	– 0,0	– 0,1	+ 0,0
100	+ 0,0	+ 0,1	+ 0,0	– 0,0	– 0,1	+ 0,0
0,5·Imax	+ 0,0	+ 0,0	+ 0,0	– 0,0	– 0,1	+ 0,0
Imax	+ 0,0	+ 0,0	+ 0,0	– 0,0	– 0,1	+ 0,0

I [%] of I_n	Error [%] Import 3x230/400V					
	Sample nr. 3.1			Sample nr. 3.2		
	cos(f)=1	cos(f)=0,5 ind.	cos(f)=0,8 cap.	cos(f)=1	cos(f)=0,5 ind.	cos(f)=0,8 cap.
1	+ 0,0			+ 0,0		
2	+ 0,0	+ 0,1	+ 0,0	+ 0,0	+ 0,1	+ 0,0
5	+ 0,0	+ 0,1	+ 0,0	+ 0,0	+ 0,1	+ 0,0
10	+ 0,0	+ 0,1	+ 0,0	+ 0,0	+ 0,1	+ 0,0
20	+ 0,0	+ 0,1	+ 0,0	+ 0,0	+ 0,1	+ 0,0
50	+ 0,0	+ 0,1	– 0,0	+ 0,0	+ 0,0	– 0,0
100	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0
0,5·Imax	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0
Imax	+ 0,0	– 0,0	+ 0,0	+ 0,0	– 0,0	+ 0,0

I [%] of I_n	Error [%] Export 3x230/400V					
	Sample nr. 3.1			Sample nr. 3.2		
	cos(f)=1	cos(f)=0,5 ind.	cos(f)=0,8 cap.	cos(f)=1	cos(f)=0,5 ind.	cos(f)=0,8 cap.
1	+ 0,0			– 0,0		
2	+ 0,0	+ 0,1	– 0,0	+ 0,0	+ 0,0	– 0,0
5	+ 0,0	+ 0,1	– 0,0	+ 0,0	+ 0,1	– 0,0
10	+ 0,0	+ 0,1	+ 0,0	+ 0,0	+ 0,1	– 0,0
20	+ 0,0	+ 0,1	+ 0,0	+ 0,0	+ 0,1	+ 0,0
50	+ 0,0	+ 0,1	– 0,0	+ 0,0	+ 0,0	– 0,0
100	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0
0,5·Imax	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0
Imax	+ 0,0	– 0,0	+ 0,0	+ 0,0	– 0,0	+ 0,0

I [%] of I_n	Error [%] Import 3x230/400V					
	Sample nr. 5.2			Sample nr. 5.3		
	cos(f)=1	cos(f)=0,5 ind.	cos(f)=0,8 cap.	cos(f)=1	cos(f)=0,5 ind.	cos(f)=0,8 cap.
1	+ 0,0			+ 0,1		
2	+ 0,0	+ 0,2	– 0,0	+ 0,0	+ 0,2	– 0,0
5	+ 0,0	+ 0,1	– 0,0	+ 0,0	+ 0,1	– 0,0
10	+ 0,0	+ 0,1	– 0,0	+ 0,0	+ 0,1	– 0,0
20	+ 0,0	+ 0,1	– 0,0	+ 0,0	+ 0,1	– 0,0
50	+ 0,0	+ 0,0	– 0,0	+ 0,0	+ 0,1	– 0,0
100	+ 0,0	+ 0,0	– 0,0	+ 0,0	+ 0,0	– 0,0
0,5·[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Im[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Информацията е заличена съгл. чл. 45 и чл. 59, ал. 1 от ЗЗЛД

ВЯРНО С ОРИГИНАЛА

I [%] of I_n	Error [%] Export 3x230/400V					
	Sample nr. 5.2			Sample nr. 5.3		
	cos(f)=1	cos(f)=0,5 ind.	cos(f)=0,8 cap.	cos(f)=1	cos(f)=0,5 ind.	cos(f)=0,8 cap.
1	− 0,1			− 0,1		
2	− 0,0	+ 0,1	− 0,1	− 0,0	+ 0,0	− 0,1
5	− 0,0	+ 0,1	− 0,1	− 0,0	+ 0,1	− 0,1
10	− 0,0	+ 0,1	− 0,0	+ 0,0	+ 0,1	− 0,0
20	− 0,0	+ 0,1	− 0,0	+ 0,0	+ 0,1	− 0,0
50	+ 0,0	+ 0,0	− 0,0	+ 0,0	+ 0,0	− 0,0
100	+ 0,0	+ 0,0	− 0,0	+ 0,0	+ 0,0	+ 0,0
0,5·Imax	+ 0,0	+ 0,0	+ 0,0	+ 0,0	− 0,0	+ 0,0
Imax	− 0,0	− 0,0	+ 0,0	+ 0,0	− 0,1	+ 0,0

<u>Remark:</u> Before the measurements were started, the voltage was connected for at least one hour and a current of $0{,}1 \cdot I_n$ was running through the meters.

ВЯРНО С ОРИГИНАЛА

Информацията е заличена съгл. чл. 45 и чл. 59, ал. 1 от ЗЗЛД

Single phase load:

I [%] of I_n	Sample nr. 1.1 Error [%] Import 3x230/400V					
	cos(f)=1			cos(f)=0,5 ind.		
	R	S	T	R	S	T
5	+ 0,0	+ 0,0	+ 0,0			
10	+ 0,0	+ 0,0	+ 0,0	+ 0,1	+ 0,0	+ 0,1
20	+ 0,0	+ 0,0	+ 0,0	+ 0,1	+ 0,0	+ 0,1
100	− 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0
0,5·Imax	− 0,0	+ 0,0	+ 0,0	− 0,1	− 0,0	− 0,0
Imax	− 0,0	+ 0,0	+ 0,0	− 0,1	− 0,0	− 0,1

I [%] of I_n	Sample nr. 1.2 Error [%] Import 3x230/400V					
	cos(f)=1			cos(f)=0,5 ind.		
	R	S	T	R	S	T
5	+ 0,0	+ 0,0	+ 0,0			
10	+ 0,0	+ 0,0	+ 0,0	+ 0,1	+ 0,1	+ 0,0
20	+ 0,0	+ 0,0	+ 0,0	+ 0,1	+ 0,0	+ 0,0
100	− 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0
0,5·Imax	+ 0,0	+ 0,0	+ 0,0	− 0,0	− 0,0	− 0,0
Imax	+ 0,0	+ 0,0	+ 0,0	− 0,0	− 0,1	− 0,0

I [%] of I_n	Sample nr. 1.1 Error [%] Export 3x230/400V					
	cos(f)=1			cos(f)=0,5 ind.		
	R	S	T	R	S	T
5	+ 0,0	+ 0,0	+ 0,0			
10	+ 0,0	+ 0,0	+ 0,0	− 0,1	− 0,0	− 0,0
20	+ 0,0	+ 0,0	+ 0,0	− 0,0	+ 0,0	− 0,0
100	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0
0,5·Imax	− 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,1
Imax	− 0,0	+ 0,0	+ 0,0	+ 0,1	+ 0,1	+ 0,1

I [%] of I_n	Sample nr. 1.2 Error [%] Export 3x230/400V					
	cos(f)=1			cos(f)=0,5 ind.		
	R	S	T	R	S	T
5	+ 0,0	+ 0,0	+ 0,0			
10	+ 0,0	+ 0,0	+ 0,0	− 0,0	− 0,0	+ 0,0
20	+ 0,0	+ 0,0	+ 0,0	− 0,0	+ 0,0	+ 0,0
100	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0
0,5·Imax	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,1	+ 0,1
Imax	+ 0,0	+ 0,0	+ 0,0	+ 0,1	+ 0,1	+ 0,1

ВЯРНО С ОРИГИНАЛА

Информацията е заличена съгл. чл. 45 и чл. 59, ал. 1 от ЗЗЛД

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I [%] of I_n	Sample nr. 2.1 Error [%] Import 3x230/400V			
	cos(f)=1		cos(f)=0,5 ind.	
	R	T	R	T
5	+ 0,0	+ 0,0		
10	+ 0,0	+ 0,0	+ 0,1	+ 0,1
20	+ 0,0	+ 0,0	+ 0,1	+ 0,1
100	+ 0,0	+ 0,0	+ 0,1	+ 0,0
0,5·Imax	− 0,0	+ 0,0	+ 0,0	+ 0,0
Imax	+ 0,0	+ 0,0	+ 0,0	+ 0,0

I [%] of I_n	Sample nr. 2.2 Error [%] Import 3x230/400V			
	cos(f)=1		cos(f)=0,5 ind.	
	R	T	R	T
5	+ 0,0	+ 0,0		
10	+ 0,0	+ 0,0	− 0,1	+ 0,0
20	+ 0,0	+ 0,0	− 0,1	+ 0,0
100	+ 0,0	+ 0,0	− 0,1	− 0,0
0,5·Imax	− 0,0	+ 0,0	− 0,2	− 0,0
Imax	− 0,0	+ 0,0	− 0,2	− 0,1

I [%] of I_n	Sample nr. 2.1 Error [%] Export 3x230/400V			
	cos(f)=1		cos(f)=0,5 ind.	
	R	T	R	T
5	− 0,0	+ 0,0		
10	− 0,0	+ 0,0	− 0,1	− 0,0
20	− 0,0	+ 0,0	− 0,1	− 0,0
100	+ 0,0	+ 0,0	− 0,1	+ 0,0
0,5·Imax	+ 0,0	+ 0,0	− 0,0	+ 0,0
Imax	− 0,0	+ 0,0	− 0,0	+ 0,0

I [%] of I_n	Sample nr. 2.2 Error [%] Export 3x230/400V			
	cos(f)=1		cos(f)=0,5 ind.	
	R	T	R	T
5	− 0,0	+ 0,0		
10	− 0,0	+ 0,0	+ 0,1	+ 0,0
20	− 0,0	+ 0,0	+ 0,1	+ 0,0
100	+ 0,0	+ 0,0	+ 0,1	+ 0,0
0,5·Imax	− 0,0	+ 0,0	+ 0,1	+ 0,0
Imax	− 0,0	+ 0,0	+ 0,2	+ 0,0

ВЯРНО С ОРИГИНАЛА

Информацията е заличена съгл. чл. 45 и чл. 59, ал. 1 от ЗЗЛД

I [%] of I_n	Sample nr. 3.1 Error [%] Import 3x230/400V					
	cos(f)=1			cos(f)=0,5 ind.		
	R	S	T	R	S	T
5	+ 0,0	+ 0,0	+ 0,1			
10	+ 0,0	+ 0,0	+ 0,1	+ 0,1	+ 0,1	+ 0,1
20	+ 0,0	+ 0,0	+ 0,1	+ 0,1	+ 0,1	+ 0,1
100	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,1
0,5·Imax	− 0,0	+ 0,0	+ 0,0	− 0,0	+ 0,0	+ 0,0
Imax	+ 0,0	− 0,0	+ 0,0	− 0,0	− 0,1	+ 0,0

I [%] of I_n	Sample nr. 3.2 Error [%] Import 3x230/400V					
	cos(f)=1			cos(f)=0,5 ind.		
	R	S	T	R	S	T
5	+ 0,0	+ 0,0	+ 0,1			
10	+ 0,0	+ 0,0	+ 0,0	+ 0,1	+ 0,0	+ 0,1
20	+ 0,0	+ 0,0	+ 0,0	+ 0,1	+ 0,1	+ 0,1
100	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0
0,5·Imax	+ 0,0	− 0,0	+ 0,0	− 0,0	− 0,0	+ 0,0
Imax	− 0,0	− 0,0	+ 0,0	− 0,0	− 0,0	+ 0,0

I [%] of I_n	Sample nr. 3.1 Error [%] Export 3x230/400V					
	cos(f)=1			cos(f)=0,5 ind.		
	R	S	T	R	S	T
5	+ 0,0	+ 0,0	+ 0,1			
10	+ 0,0	+ 0,0	+ 0,1	− 0,1	− 0,1	− 0,0
20	+ 0,0	+ 0,0	+ 0,1	− 0,1	− 0,1	+ 0,0
100	+ 0,0	+ 0,0	+ 0,0	− 0,0	− 0,0	+ 0,0
0,5·Imax	+ 0,0	− 0,0	+ 0,0	− 0,0	+ 0,0	+ 0,0
Imax	+ 0,0	− 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,1

I [%] of I_n	Sample nr. 3.2 Error [%] Export 3x230/400V					
	cos(f)=1			cos(f)=0,5 ind.		
	R	S	T	R	S	T
5	+ 0,0	− 0,0	+ 0,0			
10	+ 0,0	+ 0,0	+ 0,0	− 0,0	− 0,1	− 0,0
20	+ 0,0	+ 0,0	+ 0,0	− 0,0	− 0,1	+ 0,0
100	+ 0,0	− 0,0	+ 0,0	− 0,0	− 0,0	+ 0,0
0,5·Imax	+ 0,0	− 0,0	+ 0,0	+ 0,0	− 0,0	+ 0,0
Imax	+ 0,0	− 0,0	+ 0,0	+ 0,0	− 0,0	+ 0,1

ВЯРНО С ОРИГИНАЛА

Информацията е заличена съгл. чл. 45 и чл. 59, ал. 1 от ЗЗЛД

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Single phase load:

I [%] of I_n	Sample nr. 5.2 Error [%] Import 3x230/400V					
	cos(f)=1			cos(f)=0,5 ind.		
	R	S	T	R	S	T
5	+ 0,0	+ 0,0	− 0,0			
10	+ 0,0	+ 0,0	+ 0,0	+ 0,1	+ 0,1	+ 0,1
20	− 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,1	+ 0,1
100	− 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,1
0,5·Imax	− 0,0	+ 0,0	+ 0,0	− 0,0	− 0,0	+ 0,0
Imax	− 0,0	− 0,0	+ 0,0	− 0,0	− 0,0	− 0,0

I [%] of I_n	Sample nr. 5.3 Error [%] Import 3x230/400V					
	cos(f)=1			cos(f)=0,5 ind.		
	R	S	T	R	S	T
5	+ 0,0	+ 0,0	+ 0,0			
10	+ 0,0	+ 0,0	+ 0,0	+ 0,1	+ 0,1	+ 0,1
20	− 0,0	+ 0,0	+ 0,0	+ 0,1	+ 0,1	+ 0,1
100	− 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,1
0,5·Imax	− 0,0	+ 0,0	+ 0,0	− 0,0	− 0,0	+ 0,0
Imax	− 0,0	− 0,0	+ 0,0	− 0,1	− 0,1	− 0,0

I [%] of I_n	Sample nr. 5.2 Error [%] Export 3x230/400V					
	cos(f)=1			cos(f)=0,5 ind.		
	R	S	T	R	S	T
5	− 0,1	− 0,0	+ 0,0			
10	− 0,0	+ 0,0	+ 0,0	− 0,1	− 0,1	− 0,1
20	− 0,0	+ 0,0	+ 0,0	− 0,1	− 0,1	− 0,1
100	− 0,0	+ 0,0	+ 0,0	− 0,1	− 0,0	− 0,0
0,5·Imax	− 0,0	+ 0,0	+ 0,0	− 0,0	+ 0,0	+ 0,0
Imax	− 0,0	+ 0,0	+ 0,0	− 0,0	+ 0,0	+ 0,0

I [%] of I_n	Sample nr. 5.3 Error [%] Export 3x230/400V					
	cos(f)=1			cos(f)=0,5 ind.		
	R	S	T	R	S	T
5	− 0,1	+ 0,0	+ 0,1			
10	− 0,0	+ 0,0	+ 0,0	− 0,1	− 0,0	− 0,0
20	− 0,0	+ 0,0	+ 0,0	− 0,1	− 0,1	− 0,0
100	− 0,0	+ 0,0	+ 0,0	− 0,1	+ 0,0	+ 0,0
0,5·Imax	− 0,0	+ 0,0	+ 0,0	− 0,0	+ 0,0	+ 0,0
Imax	− 0,0	− 0,0	+ 0,0	+ 0,0	+ 0,1	+ 0,1

Remark: Before the measurements were started, the voltage was connected for at least one hour and a current of $0{,}1 \cdot I_n$ was running through the meters.

Информацията е заличена съгл. чл. 45 и чл. 59, ал. 1 от ЗЗЛД

Test: Starting and no-load condition

The starting and no-load condition is checked at reference conditions.

Results:

Sample nr. 1.1 3x230/400V	
No-load condition with no current and a voltage of 115% of the reference voltage	√
Registration checked at % of I_n Registration checked at % of I_n with export energy	0,1 % 0,1 %

Sample nr. 1.2 3x230/400V	
No-load condition with no current and a voltage of 115% of the reference voltage	√
Registration checked at % of I_n Registration checked at % of I_n with export energy	0,1 % 0,1 %

The meter is functional within 5 s after the rated voltage is applied to the meter terminals: yes

Sample nr. 2.1 3x230/400V	
No-load condition with no current and a voltage of 115% of the reference voltage	√
Registration checked at % of I_n Registration checked at % of I_n with export energy	0,2 % 0,2 %

Sample nr. 2.2 3x230/400V	
No-load condition with no current and a voltage of 115% of the reference voltage	√
Registration checked at % of I_n Registration checked at % of I_n with export energy	0,2 % 0,2 %

The meter is functional within 5 s after the rated voltage is applied to the meter terminals: yes

ВЯРНО С ОРИГИНАЛА

Информацията е заличена съгл. чл. 45 и чл. 59, ал. 1 от ЗЗЛД

Sample nr. 3.1 3x230/400V	
No-load condition with no current and a voltage of 115% of the reference voltage	√
Registration checked at % of I_n Registration checked at % of I_n with export energy	0,1 % 0,1 %

Sample nr. 3.2 3x230/400V	
No-load condition with no current and a voltage of 115% of the reference voltage	√
Registration checked at % of I_n Registration checked at % of I_n with export energy	0,1 % 0,1 %

The meter is functional within 5 s after the rated voltage is applied to the meter terminals: yes

Sample nr. 5.2 3x230/400V	
No-load condition with no current and a voltage of 115% of the reference voltage	√
Registration checked at % of I_n Registration checked at % of I_n with export energy	0,1 % 0,1 %

Sample nr. 5.3 3x230/400V	
No-load condition with no current and a voltage of 115% of the reference voltage	√
Registration checked at % of I_n Registration checked at % of I_n with export energy	0,1 % 0,1 %

The meter is functional within 5 s after the rated voltage is applied to the meter terminals: yes

ВЯРНО С ОРИГИНАЛА

Информацията е заличена съгл. чл. 45 и чл. 59, ал. 1 от ЗЗЛД

Test: Meter constant

The meter constant is checked with the value stated on the nameplate.

Results: The test is performed with: Sample nr. 1.1
Sample nr. 1.2

The meter constant as stated on the nameplate complies with the measured values of the test output.

ВЯРНО С ОРИГИНАЛА

Информацията е заличена съгл. чл. 45 и чл. 59, ал. 1 от ЗЗЛД