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	:	METER&CONTROL d.o.o. Tršćanska 21 11080 Zemun Serbia
Measuring instrument	:	**A poly phase static watthourmeter** Manufacturer : METER&CONTROL Type : ST40xC
Test specifications	:	- IEC 62052-11 "Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment" - IEC 62053-22 "Electricity metering equipment (AC) - Particular requirements - Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)" - IEC 62053-23 "Electricity metering equipment (AC) - Particular requirements - Part 23: Static meters for reactive energy (classes 2 and 3)" - 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	:	March 2014 up to and including September 2015
Issue date	:	18 September 2015

Performed by:	Reviewed by:
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TESTING
RvA L 029

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 0,5 S of the IEC 62053-22 as well as the requirements for class 2 of the IEC 62053-23 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 EC type-examination certificate nr. T10629 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 0,08% for power factor=1, and 0,14% 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 ST40xC meter is a revised variant of the tested ST40xD meter, using the same sensor technique and housing, but intended for indirect connection. For the tests which are not performed, as indicated in annex 1, a reference can be made to the investigations with the ST40xD meter, as presented in the type evaluation report NMi-14200185-02 issued by NMi. The results of these tests can be applied also for the ST40xC meter. 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.

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 62053-23 / EN 50470-3:

article IEC 62053-22, IEC 62053-23 / EN 50470-3	tests:	passed	not applicable	not performed	annex 4 page
8.1 / 8.1	error due to variation of current (at reference conditions)	√			1
8.1 / 8.1	error due to variation of current (single phase load)	√			3
8.3 / 8.7.9	starting- and no-load condition	√			5
8.4 / 8.7.10	meter constant	√			6
8.2 / 8	variation of the error due to variation of the voltage	√			7
8.2 / 8	variation of the error due to variation of the frequency	√			9
8.2 / 8.5	reversed phase sequence			√*	-
8.2 / 8.5	voltage unbalance			√*	-
8.2 / 8.5	operation of accessories	√			10
8.2 / -	variation of the error due to variation of the temperature	√			11
8.2 / 8.5	variation of the error due to harmonics			√*	-
8.2 / 8.5	continuous magnetic induction of external origin			√*	-
8.2 / 8.5	magnetic induction of external origin (0,5 mT)			√*	-
7.1 / 7.1	power consumption	√			13
7.2 / 8.6	variation of the error due to short-time overcurrents	√			14
7.3 / 8.5	variation of the error due to self-heating	√			15
7.3.3 / 7.2	AC voltage test	√			17

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	√			17
7.4 / -	earth fault	√			19
7.5.2 / 7.4.5	immunity to electrostatic discharges	√			-
7.5.3 / 7.4.6	immunity to electromagnetic RF-fields	√			20
7.5.4 / 7.4.7	fast transient bursts	√			21
7.5.5 / 7.4.8	immunity to conducted disturbances	√			23
7.5.6 / 7.4.9	surge immunity	√			25
7.5.7 / 7.4.10	damped oscillatory waves immunity	√			27
7.5.8 / 7.4.13	radio interference suppression	√			29
7.1.2 / 7.4.4	influence of supply voltage			√*	-
7.2 / 7.2	influence of heating			√*	-
6.3.1, 6.3.2, 6.3.3	dry heat test, cold test and damp heat, cyclic test			√*	-
6.3.4	solar radiation		√		-
5.2.2.2, 5.2.2.3	shock and vibration tests			√*	-
5.2.2.1	spring hammer test			√*	-
5.9	protection against dust and water			√*	-
5.8	test of resistance to heat and fire			√*	-

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	√			32
8.2	repeatability	√			33
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	√			35
8.3	variation of the error due to variation of the temperature	√			36
8.4	maximum permissible error	√			38
8.5	earth fault	√			19

Other tests:

	tests:	passed	not applicable	not performed	annex 4 page
TR 50579	disturbance with harmonics in the frequency range 2-150 kHz	√			40
WELMEC 11	one phase export, remaining phases import			√*	-

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

The EMC-tests and the diëlectric tests are performed at the TÜV Rheinland EPS BV laboratory in Leek, the Netherlands.

The operation of accessories test with GSM/GPRS communication is perfromed at METER & CONTROL d.o.o. in Zemum, Serbia and is witnessed by NMi.

*) The ST40xC meter is a revised variant of the tested ST40xD meter, using the same sensor technique and housing, but intended for indirect connection. For the tests which are not performed, as indicated in annex 1, a reference can be made to the investigations with the ST40xD meter, as presented in the type evaluation report NMi-14200185-02 issued by NMi. The results of these tests can be applied also for the ST40xC meter.

Annex 2: Characteristics of the tested 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] [imp./kvarh]
3.1.	ST402C	119943	2014	0,05	5	6	3x230/400	50	10.000
3.2.	ST402C	119944	2014	0,05	5	6	3x230/400	50	10.000
3.3.	ST402C	119945	2014	0,05	5	6	3x230/400	50	10.000
3.4.	ST402C	119946	2014	0,05	5	6	3x230/400	50	10.000
3.5.	ST402C	119947	2014	0,05	5	6	3x230/400	50	10.000
3.6.	ST402C	119948	2014	0,05	5	6	3x230/400	50	10.000
3.7.	ST402C	119949	2014	0,05	5	6	3x230/400	50	10.000
3.8.	ST402C	119951	2014	0,05	5	6	3x230/400	50	10.000
3.9.	ST402C	120036	2015	0,05	5	6	3x230/400	50	10.000
3.10.	ST402C	120016	2015	0,05	5	6	3x230/400	50	10.000

IEC accuracy class:	0,5 S	IEC 62053-22	
	2	IEC 62053-23	
	C	EN 50470-3	
Software version:	V030433	881918A7	(ST401C)
		85AFAA4F	(ST402C)
		11EAEBD6	(ST405C)
Hardware version:	ST401 V2.11.0	(PLC)	
	ST402 V2.11.0	(GSM/GPRS)	
	ST405 V2.9.0	(RS485)	

Full type designation: ST402C-15A93R55-M2011

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 MI-003 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.

Photographs:

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.

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.		
5.4	requirements for terminals		
	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.

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 quantity 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.

500

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: Active energy measurements, balanced load:

I [%] of I_n	Error [%] Import					
	Sample nr. 3.3			Sample nr. 3.4		
	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	+ 0,2	+ 0,1	+ 0,0	+ 0,1	+ 0,1
5	+ 0,0	+ 0,2	+ 0,1	+ 0,0	+ 0,2	+ 0,1
10	+ 0,0	+ 0,2	+ 0,1	+ 0,0	+ 0,2	+ 0,1
20	+ 0,0	+ 0,2	+ 0,1	+ 0,0	+ 0,1	+ 0,1
50	+ 0,0	+ 0,1	+ 0,1	+ 0,0	+ 0,1	+ 0,1
100	– 0,0	+ 0,1	+ 0,0	+ 0,0	+ 0,1	+ 0,0
Imax	– 0,0	+ 0,0	– 0,0	– 0,0	+ 0,0	+ 0,0

I [%] of I_n	Error [%] Export					
	Sample nr. 3.3			Sample nr. 3.4		
	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	+ 0,2	– 0,1	+ 0,0	+ 0,2	– 0,0
5	+ 0,0	+ 0,2	– 0,1	+ 0,0	+ 0,2	– 0,0
10	+ 0,0	+ 0,2	– 0,1	+ 0,0	+ 0,2	– 0,0
20	+ 0,0	+ 0,2	– 0,1	+ 0,0	+ 0,1	+ 0,5
50	+ 0,0	+ 0,1	– 0,1	+ 0,0	+ 0,1	– 0,0
100	– 0,0	+ 0,1	– 0,1	+ 0,0	+ 0,1	– 0,0
Imax	– 0,0	+ 0,0	– 0,1	– 0,0	+ 0,0	– 0,0

Reactive energy measurements, balanced load:

I [%] of I_n	Error [%] Import					
	Sample nr. 3.3			Sample nr. 3.4		
	sin(f)=1	sin(f)=0,5 ind.	sin(f)=0,5 cap.	sin(f)=1	sin(f)=0,5 ind.	sin(f)=0,5 cap.
2	+ 0,1			+ 0,0		
5	+ 0,1	– 0,1	+ 0,3	+ 0,0	– 0,1	+ 0,2
10	+ 0,0	– 0,1	+ 0,3	+ 0,0	– 0,1	+ 0,2
20	+ 0,0	– 0,1	+ 0,2	+ 0,0	– 0,1	+ 0,2
50	+ 0,0	– 0,1	+ 0,1	+ 0,0	– 0,1	+ 0,1
100	– 0,0	– 0,1	+ 0,1	+ 0,0	– 0,1	+ 0,1
Imax	– 0,0	– 0,1	+ 0,0	– 0,0	– 0,1	+ 0,0

I [%] of I_n	Error [%] Import					
	Sample nr. 3.3			Sample nr. 3.4		
	sin(f)=1	sin(f)=0,25 ind.	sin(f)=0,25 cap.	sin(f)=1	sin(f)=0,25 ind.	sin(f)=0,25 cap.
10	+ 0,0	– 0,4	+ 0,2	+ 0,0	– 0,3	+ 0,2
20	+ 0,0	– 0,4	+ 0,4	+ 0,0	– 0,3	+ 0,3
100	– 0,0	– 0,2	+ 0,2	+ 0,0	– 0,1	+ 0,2
Imax	– 0,0	– 0,2	+ 0,1	+ 0,0	– 0,1	+ 0,1

I [%] of I_n	Error [%] Export					
	Sample nr. 3.3			Sample nr. 3.4		
	sin(f)=1	sin(f)=0,5 ind.	sin(f)=0,5 cap.	sin(f)=1	sin(f)=0,5 ind.	sin(f)=0,5 cap.
2	– 0,0			+ 0,0		
5	+ 0,0	– 0,2	+ 0,2	+ 0,0	– 0,1	+ 0,2
10	+ 0,0	– 0,2	+ 0,2	+ 0,0	– 0,1	+ 0,2
20	+ 0,0	– 0,2	+ 0,2	+ 0,0	– 0,1	+ 0,2
50	+ 0,0	– 0,1	+ 0,1	+ 0,0	– 0,1	+ 0,1
100	– 0,0	– 0,1	+ 0,1	+ 0,0	– 0,1	+ 0,1
Imax	– 0,0	– 0,1	+ 0,0	+ 0,0	– 0,1	+ 0,0

I [%] of I_n	Error [%] Export					
	Sample nr. 3.3			Sample nr. 3.4		
	sin(f)=1	sin(f)=0,25 ind.	sin(f)=0,25 cap.	sin(f)=1	sin(f)=0,25 ind.	sin(f)=0,25 cap.
10	+ 0,0	– 0,4	+ 0,4	+ 0,0	– 0,3	+ 0,3
20	+ 0,0	– 0,4	+ 0,4	+ 0,0	– 0,3	+ 0,3
100	– 0,0	– 0,2	+ 0,2	+ 0,0	– 0,2	+ 0,2
Imax	– 0,0	– 0,2	+ 0,1	– 0,0	– 0,1	+ 0,1

Active energy measurements, single phase load:

I [%] of I_n	Sample nr. 3.3 Error [%] Import					
	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	+ 0,2	+ 0,2	+ 0,2
20	+ 0,0	+ 0,0	+ 0,0	+ 0,2	+ 0,2	+ 0,2
100	+ 0,0	− 0,0	− 0,0	+ 0,0	+ 0,0	+ 0,1
Imax	− 0,0	− 0,1	− 0,0	− 0,0	+ 0,0	+ 0,0

I [%] of I_n	Sample nr. 3.4 Error [%] Import					
	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	+ 0,2	+ 0,2	+ 0,1
20	+ 0,0	+ 0,0	+ 0,0	+ 0,2	+ 0,2	+ 0,1
100	+ 0,0	+ 0,0	+ 0,0	+ 0,1	+ 0,1	+ 0,1
Imax	+ 0,0	− 0,0	+ 0,0	+ 0,0	+ 0,0	+ 0,0

I [%] of I_n	Sample nr. 3.3 Error [%] Export					
	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	− 0,2	− 0,2
20	+ 0,0	− 0,0	+ 0,0	− 0,1	− 0,2	− 0,2
100	+ 0,0	− 0,0	− 0,0	− 0,0	− 0,1	− 0,2
Imax	− 0,0	− 0,1	− 0,1	− 0,0	− 0,1	− 0,1

I [%] of I_n	Sample nr. 3.4 Error [%] Export					
	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	− 0,2	− 0,1
20	+ 0,0	+ 0,0	+ 0,0	− 0,1	− 0,1	− 0,1
100	+ 0,0	− 0,0	+ 0,0	− 0,0	− 0,1	− 0,0
Imax	+ 0,0	− 0,0	+ 0,0	− 0,0	− 0,1	− 0,0

Reactive energy measurements, single phase load:

I [%] of I_n	Sample nr. 3.3 Error [%] Import								
	sin(f)=1			sin(f)=0,5 ind.			sin(f)=0,5 cap.		
	R	S	T	R	S	T	R	S	T
5	+ 0,1	+ 0,1	+ 0,1						
10	+ 0,1	+ 0,0	+ 0,1	– 0,1	– 0,1	– 0,2	+ 0,3	+ 0,3	+ 0,3
20	+ 0,1	+ 0,0	+ 0,0	– 0,1	– 0,1	– 0,2	+ 0,2	+ 0,2	+ 0,3
100	+ 0,0	– 0,0	– 0,0	– 0,0	– 0,1	– 0,1	+ 0,0	+ 0,1	+ 0,1
Imax	+ 0,0	– 0,0	– 0,0	+ 0,0	– 0,1	– 0,1	+ 0,0	+ 0,0	+ 0,1

I [%] of I_n	Sample nr. 3.4 Error [%] Import								
	sin(f)=1			sin(f)=0,5 ind.			sin(f)=0,5 cap.		
	R	S	T	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	+ 0,2	+ 0,2	+ 0,2
20	+ 0,0	+ 0,0	+ 0,1	– 0,1	– 0,1	– 0,1	+ 0,2	+ 0,2	+ 0,2
100	+ 0,0	+ 0,0	+ 0,0	– 0,0	– 0,1	– 0,0	+ 0,1	+ 0,1	+ 0,1
Imax	+ 0,0	– 0,0	+ 0,0	– 0,0	– 0,1	– 0,0	+ 0,0	+ 0,0	+ 0,0

I [%] of I_n	Sample nr. 3.3 Error [%] Export								
	sin(f)=1			sin(f)=0,5 ind.			sin(f)=0,5 cap.		
	R	S	T	R	S	T	R	S	T
5	+ 0,0	– 0,1	– 0,0						
10	+ 0,0	– 0,0	+ 0,0	– 0,2	– 0,3	– 0,3	+ 0,2	+ 0,1	+ 0,2
20	+ 0,0	– 0,0	+ 0,0	– 0,1	– 0,2	– 0,2	+ 0,2	+ 0,2	+ 0,2
100	+ 0,0	– 0,0	– 0,0	– 0,0	– 0,1	– 0,2	+ 0,0	+ 0,0	+ 0,1
Imax	– 0,0	– 0,1	– 0,1	– 0,0	– 0,1	– 0,1	– 0,0	+ 0,0	+ 0,0

I [%] of I_n	Sample nr. 3.4 Error [%] Export								
	sin(f)=1			sin(f)=0,5 ind.			sin(f)=0,5 cap.		
	R	S	T	R	S	T	R	S	T
5	+ 0,1	+ 0,0	+ 0,0						
10	+ 0,0	+ 0,0	+ 0,0	– 0,1	– 0,2	– 0,1	+ 0,2	+ 0,2	+ 0,2
20	+ 0,1	+ 0,0	+ 0,0	– 0,1	– 0,2	– 0,1	+ 0,2	+ 0,2	+ 0,2
100	+ 0,0	– 0,0	+ 0,0	– 0,0	– 0,1	– 0,0	+ 0,1	+ 0,1	+ 0,1
Imax	+ 0,0	– 0,0	+ 0,0	– 0,0	– 0,1	– 0,0	+ 0,0	+ 0,0	+ 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.

Test: Starting and no-load condition

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

<u>Results:</u> Active energy measurements:

Sample nr. 3.3	
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. 3.4	
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

Reactive energy measurements:

Sample nr. 3.3	
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	0,3 % 0,3 %

Sample nr. 3.4	
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	0,3 % 0,3 %

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

Test: Meter constant

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

Results: The test is performed with: Sample nr. 3.3
Sample nr. 3.4

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

Test: Variation of the error due to variation of the voltage

The variation of the error is measured due to variation of the voltage at nominal current and different values of the power factor.

Results: Active energy measurements:

Sample nr. 3.3 I_n		
percentage of U_{ref}	power factor	variation [%]
115	1	+ 0,0
	0,5 ind.	+ 0,0
110	1	+ 0,0
	0,5 ind.	+ 0,0
90	1	− 0,1
	0,5 ind.	− 0,1
80	1	− 0,1
	0,5 ind.	− 0,1
6	1	− 0,3
	0,5 ind.	− 0,3
<6	1	no registration
	0,5 ind.	

Sample nr. 3.4 I_n		
percentage of U_{ref}	power factor	variation [%]
115	1	+ 0,1
	0,5 ind.	+ 0,1
110	1	+ 0,0
	0,5 ind.	+ 0,0
90	1	− 0,0
	0,5 ind.	− 0,1
80	1	− 0,1
	0,5 ind.	− 0,1
6	1	− 0,3
	0,5 ind.	− 0,4
<6	1	no registration
	0,5 ind.	

Reactive energy measurements:

Sample nr. 3.3 I_n		
percentage of U_{ref}	power factor	variation [%]
115	1	+ 0,1
	0,5 ind.	+ 0,1
	0,5 cap.	+ 0,0
110	1	+ 0,0
	0,5 ind.	+ 0,0
	0,5 cap.	+ 0,0
90	1	– 0,1
	0,5 ind.	– 0,0
	0,5 cap.	– 0,1
80	1	– 0,1
	0,5 ind.	– 0,1
	0,5 cap.	– 0,1
6	1	– 0,3
	0,5 ind.	– 0,3
	0,5 cap.	– 0,4
<6	1	no registration
	0,5 ind.	
	0,5 cap.	

Sample nr. 3.4 I_n		
percentage of U_{ref}	power factor	variation [%]
115	1	+ 0,1
	0,5 ind.	+ 0,1
	0,5 cap.	+ 0,0
110	1	+ 0,0
	0,5 ind.	+ 0,0
	0,5 cap.	+ 0,0
90	1	– 0,0
	0,5 ind.	– 0,0
	0,5 cap.	– 0,1
80	1	– 0,1
	0,5 ind.	– 0,1
	0,5 cap.	– 0,1
6	1	– 0,4
	0,5 ind.	– 0,3
	0,5 cap.	– 0,4
<6	1	no registration
	0,5 ind.	
	0,5 cap.	

Definition: Variation = (Error at percentage of U_{ref}) - (Error at reference conditions)

Test: Variation of the error due to variation of the frequency

The variation of the error is measured at the stated changes of the frequency at different values of the current and the power factor.

Results: Active energy measurements:

Sample nr. 3.3		
U_{ref}	Variation at frequency	
	49 Hz	51 Hz
$I=0,1I_n$, cos(f)=1	– 0,0	+ 0,0
$I=0,5I_{max}$, cos(f)=1	+ 0,0	+ 0,0
$I=0,5I_{max}$, cos(f)=0,5 ind.	– 0,0	+ 0,0

Sample nr. 3.4		
U_{ref}	Variation at frequency	
	49 Hz	51 Hz
$I=0,1I_n$, cos(f)=1	– 0,0	+ 0,0
$I=0,5I_{max}$, cos(f)=1	+ 0,0	+ 0,0
$I=0,5I_{max}$, cos(f)=0,5 ind.	– 0,0	+ 0,0

Reactive energy measurements:

Sample nr. 3.3		
U_{ref}	Variation at frequency	
	49 Hz	51 Hz
$I=0,1I_n$, sin(f)=1	– 0,0	+ 0,0
$I=0,5I_{max}$, sin(f)=1	+ 0,0	+ 0,0
$I=0,5I_{max}$, sin(f)=0,5 ind.	+ 0,0	+ 0,0
$I=0,5I_{max}$, sin(f)=0,5 cap.	– 0,0	+ 0,0

Sample nr. 3.4		
U_{ref}	Variation at frequency	
	49 Hz	51 Hz
$I=0,1I_n$, sin(f)=1	– 0,0	+ 0,0
$I=0,5I_{max}$, sin(f)=1	+ 0,0	+ 0,0
$I=0,5I_{max}$, sin(f)=0,5 ind.	+ 0,0	+ 0,0
$I=0,5I_{max}$, sin(f)=0,5 cap.	– 0,0	+ 0,0

Definition: Variation = (Error at stated frequency) - (Error at reference conditions)

Test: Operation of accessories

The influence of the operation of accessories is determined at 5% of the nominal current.

Results: Active energy measurements:

Sample nr. 3.10	
error without operation of accessories [%]	– 0,20
error with communication via the GPRS [%]	– 0,22
variation [%]	– 0,02

Reactive energy measurements:

Sample nr. 3.10	
error without operation of accessories [%]	– 0,22
error with communication via the GPRS [%]	– 0,22
variation [%]	+ 0,00

Definition: Variation = (Error with operation of accessories) - (Error without operation of accessories)

Test: Variation of the error due to variation of the temperature

The variation of the error is determined due to variation of the temperature.
The error of indication is measured at a reference temperature of +23°C and at the stated temperatures.
The shift of the error due to the shift of temperature is stated in the following tables.

Results: Active energy measurements:

Sample nr. 3.3								
U_{ref}	Variation at temperature							Max. temperature coefficient %/K
	-40°C	-25°C	-10°C	5°C	40°C	55°C	70°C	
$I=0,1I_n$, cos(f)=1	+ 0,4	+ 0,3	+ 0,2	+ 0,0	– 0,1	– 0,1	– 0,0	0,011
$I=0,1I_n$, cos(f)=0,5 ind.	+ 0,4	+ 0,3	+ 0,2	+ 0,1	– 0,1	– 0,2	– 0,0	0,012
$I=I_n$, cos(f)=1	+ 0,4	+ 0,3	+ 0,2	+ 0,1	– 0,1	– 0,1	– 0,0	0,011
$I=I_n$, cos(f)=0,5 ind.	+ 0,4	+ 0,3	+ 0,2	+ 0,1	– 0,1	– 0,1	– 0,1	0,010
$I=I_{max}$, cos(f)=1	+ 0,4	+ 0,3	+ 0,2	+ 0,1	– 0,1	– 0,1	– 0,1	0,010
$I=I_{max}$, cos(f)=0,5 ind.	+ 0,4	+ 0,3	+ 0,2	+ 0,1	– 0,1	– 0,1	– 0,1	0,010

Sample nr. 3.4								
U_{ref}	Variation at temperature							Max. temperature coefficient %/K
	-40°C	-25°C	-10°C	5°C	40°C	55°C	70°C	
$I=0,1I_n$, cos(f)=1	+ 0,3	+ 0,1	+ 0,2	– 0,0	– 0,1	– 0,2	+ 0,0	0,014
$I=0,1I_n$, cos(f)=0,5 ind.	+ 0,3	+ 0,1	+ 0,2	– 0,0	– 0,1	– 0,1	+ 0,1	0,014
$I=I_n$, cos(f)=1	+ 0,3	+ 0,1	+ 0,2	– 0,0	– 0,1	– 0,1	– 0,0	0,012
$I=I_n$, cos(f)=0,5 ind.	+ 0,2	+ 0,1	+ 0,2	– 0,0	– 0,1	– 0,1	+ 0,0	0,012
$I=I_{max}$, cos(f)=1	+ 0,2	+ 0,1	+ 0,2	– 0,0	– 0,1	– 0,1	– 0,0	0,011
$I=I_{max}$, cos(f)=0,5 ind.	+ 0,2	+ 0,1	+ 0,2	– 0,0	– 0,1	– 0,1	+ 0,0	0,012

Definition: Variation = (Error at specified temperature) - (Average error at +23°C)

Remark: Instead of the prescribed 20 K range (see par. 8.2, remark 9, of the IEC 62053-21), the above mentioned temperatures are used.

Reactive energy measurements:

Sample nr. 3.3								
U_{ref}	Variation at temperature							Max. temperature coëfficiënt %/K
	-40°C	-25°C	-10°C	5°C	40°C	55°C	70°C	
$I=0,1I_n$, sin(f)=1	+ 0,4	+ 0,3	+ 0,2	+ 0,0	− 0,1	− 0,1	− 0,0	0,012
$I=0,2I_n$, sin(f)=0,5 ind.	+ 0,3	+ 0,2	+ 0,2	+ 0,0	− 0,1	− 0,2	− 0,1	0,011
$I=0,2I_n$, sin(f)=0,5 cap.	+ 0,4	+ 0,3	+ 0,3	+ 0,0	− 0,1	− 0,2	− 0,0	0,014
$I=I_n$, sin(f)=1	+ 0,4	+ 0,3	+ 0,2	+ 0,0	− 0,1	− 0,1	− 0,1	0,012
$I=I_n$, sin(f)=0,5 ind.	+ 0,4	+ 0,3	+ 0,2	+ 0,0	− 0,1	− 0,1	− 0,1	0,010
$I=I_n$, sin(f)=0,5 cap.	+ 0,4	+ 0,3	+ 0,2	+ 0,1	− 0,1	− 0,1	− 0,1	0,011
$I=I_{max}$, sin(f)=1	+ 0,4	+ 0,3	+ 0,2	+ 0,1	− 0,1	− 0,1	− 0,1	0,011
$I=I_{max}$, sin(f)=0,5 ind.	+ 0,4	+ 0,3	+ 0,2	+ 0,0	− 0,1	− 0,1	− 0,1	0,011
$I=I_{max}$, sin(f)=0,5 cap.	+ 0,4	+ 0,3	+ 0,2	+ 0,1	− 0,1	− 0,1	− 0,1	0,011

Sample nr. 3.4								
U_{ref}	Variation at temperature							Max. temperature coëfficiënt %/K
	-40°C	-25°C	-10°C	5°C	40°C	55°C	70°C	
$I=0,1I_n$, sin(f)=1	+ 0,2	+ 0,1	+ 0,2	− 0,0	− 0,1	− 0,2	+ 0,0	0,015
$I=0,2I_n$, sin(f)=0,5 ind.	+ 0,2	+ 0,1	+ 0,2	− 0,0	− 0,1	− 0,2	− 0,1	0,013
$I=0,2I_n$, sin(f)=0,5 cap.	+ 0,3	+ 0,1	+ 0,2	− 0,0	− 0,1	− 0,1	+ 0,1	0,015
$I=I_n$, sin(f)=1	+ 0,2	+ 0,1	+ 0,2	− 0,0	− 0,1	− 0,1	− 0,0	0,013
$I=I_n$, sin(f)=0,5 ind.	+ 0,2	+ 0,1	+ 0,2	− 0,0	− 0,1	− 0,2	− 0,1	0,012
$I=I_n$, sin(f)=0,5 cap.	+ 0,2	+ 0,1	+ 0,2	− 0,0	− 0,1	− 0,1	+ 0,0	0,012
$I=I_{max}$, sin(f)=1	+ 0,2	+ 0,2	+ 0,2	− 0,0	− 0,1	− 0,1	− 0,0	0,012
$I=I_{max}$, sin(f)=0,5 ind.	+ 0,2	+ 0,1	+ 0,2	− 0,0	− 0,1	− 0,2	− 0,1	0,011
$I=I_{max}$, sin(f)=0,5 cap.	+ 0,2	+ 0,1	+ 0,2	− 0,0	− 0,1	− 0,1	+ 0,0	0,011

Definition: Variation = (Error at specified temperature) - (Average error at +23°C)

Remark: Instead of the prescribed 20 K range (see par. 8.2, remark 7, of the IEC 62053-23), the above mentioned temperatures are used.

Test: Power consumption

The power consumption of the voltage circuits and the current circuits is measured at reference conditions and at the stated current.

Results: Active energy measurements:

	Sample nr. 3.3	Sample nr. 3.4
maximum power consumption of the voltage circuits	1,4 VA and 0,5 W	1,4 VA and 0,5 W
maximum power consumption of the current circuits with nominal current	0,14 VA	0,36 VA

Reactive energy measurements:

	Sample nr. 3.3	Sample nr. 3.4
maximum power consumption of the voltage circuits	1,4 VA and 0,5 W	1,4 VA and 0,5 W
maximum power consumption of the current circuits with nominal current	0,14 VA	0,36 VA

500

Test: Variation of the error due to short time overcurrents

The meter is tested by applying an impulse current to the current circuit of the meter. During the test the voltage circuits were energized with the reference voltage. Before and after the test the error of indication is measured at reference conditions.

The impulse current had the following characteristics:
- 20 times the maximum current, during 0,5 s

The tests are performed with sample nr. 3.4.

<u>Results:</u> The difference in the error of indication at reference conditions before and after the test was not greater than the uncertainty of the measurements.

Test: Variation of the error due to self-heating

The influence of self-heating of the watthourmeter is determined by difference occurring in the error at measuring directly after switching-in of the maximum current with respect to a second measurement at least one hour after switching-in of the current and after thermal stability is reached.

During the test cables are used with an area of 7 square mm.

Results: Active energy measurements:

time [min]	Sample nr. 3.3		Sample nr. 3.4	
	cos(f)=1	cos(f)=0,5 ind.	cos(f)=1	cos(f)=0,5 ind.
0	– 0,03	+ 0,01	+ 0,00	+ 0,03
5	– 0,03	+ 0,00	+ 0,00	+ 0,04
10	– 0,04	+ 0,01	+ 0,00	+ 0,03
15	– 0,03	+ 0,01	+ 0,00	+ 0,04
30	– 0,04	+ 0,01	+ 0,00	+ 0,04
45	– 0,04	+ 0,01	+ 0,00	+ 0,04
60	– 0,03	+ 0,01	+ 0,00	+ 0,04
90	– 0,04	+ 0,01	+ 0,00	+ 0,04
120	– 0,04	+ 0,01	+ 0,01	+ 0,04
Variation [%]	– 0,01	+ 0,00	+ 0,01	+ 0,01

Definition: Variation = (Error after thermal stability) - (Error at the start)

Remark: Before the measurements were started, the voltage was connected for at least 2 hours.

Reactive energy measurements:

time [min]	Sample nr. 3.3			Sample nr. 3.4		
	sin(f)=1	sin(f)=0,5 ind.	sin(f)=0,5 cap.	sin(f)=1	sin(f)=0,5 ind.	sin(f)=0,5 cap.
0	– 0,03	– 0,07	+ 0,03	+ 0,01	– 0,04	+ 0,05
5	– 0,03	– 0,07	+ 0,07	+ 0,00	– 0,03	+ 0,06
10	– 0,02	– 0,07	+ 0,06	+ 0,00	– 0,03	+ 0,06
15	– 0,03	– 0,08	+ 0,07	+ 0,01	– 0,04	+ 0,06
30	– 0,02	– 0,09	+ 0,05	+ 0,01	– 0,04	+ 0,06
45	– 0,03	– 0,10	+ 0,06	+ 0,00	– 0,04	+ 0,06
60	– 0,02	– 0,10	+ 0,05	+ 0,00	– 0,04	+ 0,05
90	– 0,03	– 0,10	+ 0,07	+ 0,00	– 0,03	+ 0,07
120	– 0,02	– 0,10	+ 0,10	+ 0,01	– 0,04	+ 0,07
Variation [%]	+ 0,01	– 0,03	+ 0,07	+ 0,00	+ 0,00	+ 0,02

<u>Definition:</u> Variation = (Error after thermal stability) - (Error at the start)

<u>Remark:</u> Before the measurements were started, the voltage was connected for at least 2 hours.

Test: Impulse voltage test and AC voltage test

The insulation properties of the watthourmeter are tested by performing an impulse voltage test and an AC voltage test. Before the tests and after the test the error of the meter is measured at reference conditions.

a) Impulse voltage test
The meter is tested according to:
- 6 kV in accordance with the IEC 62052-11

The test is performed with each circuit. The impulse voltage is applied ten times with one polarity and then repeated with the other polarity.
The minimum time between the impulses was 3 s.

b) AC voltage test
The AC voltage test is performed with a r.m.s. test voltage of:
- 4 kV, between all current and voltage circuits as well as auxiliairy circuits above 40V, connected together, and, on the other hand earth;
- 2 kV, between circuits not intended to be connected together in service.

The tests are performed with sample nr. 3.1.

Results:

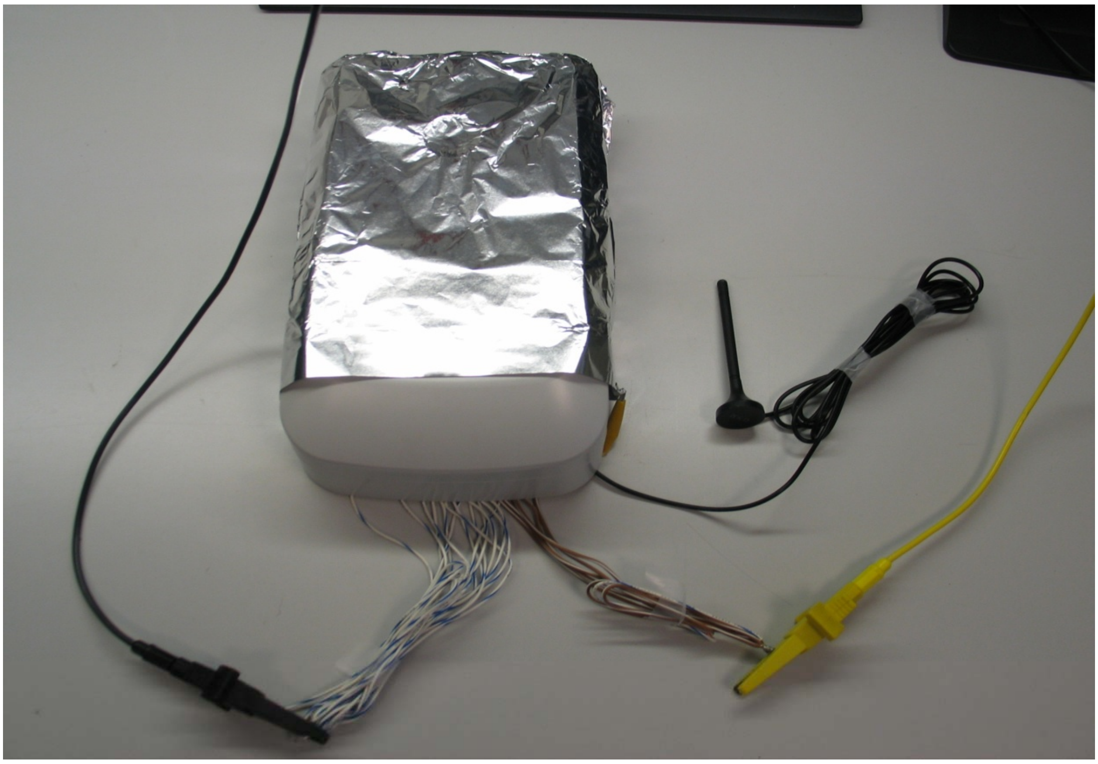
a) Impulse voltage test
During the test no flashover, disruptive discharge or puncture occurred.

b) AC voltage test
During the test no flashover, disruptive discharge or puncture occurred.

The difference in the error of indication at reference conditions before and after the test was not greater than the uncertainty of the measurements.
No mechanical damage occurred to the meter.

Remark: During the test with 6 kV according to IEC 62052-11 the following auxilliary circuits are investigated:
- M-Bus, Relay, Tariff inputs, S0 input, Pulse output

Photograph of the impulse voltage test:



Test: Immunity to earth fault

During a test under simulated earth fault condition in one of the three lines, all voltages are increased to 1,1 times the nominal voltage during 4 hours.
The neutral terminal is connected to phase R, as indicated in Annex C of the IEC 62052-11. In this way the two voltage terminals of the meters under test which are not affected by the earth fault are connected to 1,9 times the nominal phase voltages.

During the test the current was 50% of In, power factor 1, with symmetrical load.

Before and after the test the error of indication is measured at nominal current.

Results: The test is performed with sample nr. 3.3.

The change of the error of indication at nominal current due to the earth fault test was negligible.

Damage after the test	: no
Correct operation after the test	: yes

Test: Immunity to electromagnetic RF-fields

The watthourmeter is tested with electromagnetic RF fields according to IEC 61000-4-3 with the characteristics:

frequency [MHz]	:	80 - 2000
modulation	:	80% AM, 1 kHz sine wave

The following tests are performed:

with active energy:
a) without any current in the current circuits and the current terminals are open circuit, with a field strength of 30 V/m;
b) with nominal current and power factor = 1, with a field strength of 10 V/m.

The tests are performed with reference voltage, with sample nr. 3.6 (GSM/GPRS).

Results: During the tests the following was observed:
a) change of the register due to the RF-field: 0,00 kWh
produced signals of the test output: 0 impulses
b) the maximum measured influence due to the RF-field was negligible.

The uncertainty of the measurements was 0,4%.

Remark: During the test the following auxilliary circuits were connected:
- M-BUS, Relay, Pulse output, S0 pulse input, Tariff input

500

Test: Fast transient bursts

The meter is tested with fast transient bursts. During the tests the voltage and auxiliary circuits were energized with reference voltage.
At least 60 seconds of positive bursts and 60 seconds of negative bursts were applied during each test to the circuits.

The following test is performed:

- with nominal current:	peak value current/voltage circuit	:	4 kV
	peak value auxiliary circuit	:	2 kV

Besides the stated peak value, the fast transient bursts had the following characteristics:

rise time	:	5	ns
peak width	:	50	ns
peak distance	:	200	µs
burst duration	:	15	ms
burst distance	:	300	ms

The test is performed with sample nr. 3.1.

Results: During the test the influence was negligible.

Remark: During the test the following auxilliary circuits were connected:
- M-Bus, Relay, Tariff inputs, S0 input, Pulse output

Photograph of the burst test:

Test: Immunity to conducted disturbances, induced by radio-frequency fields

The meter is tested with conducted disturbances according to IEC 61000-4-6, with the characteristics:

frequency	:	0,15 - 80 MHz
voltage level	:	10 V
modulation	:	80% AM, 1 kHz sine wave

The following tests are performed:
- with nominal current and power factor = 1, with active energy

The tests are performed with reference voltage, with sample nr. 3.6.

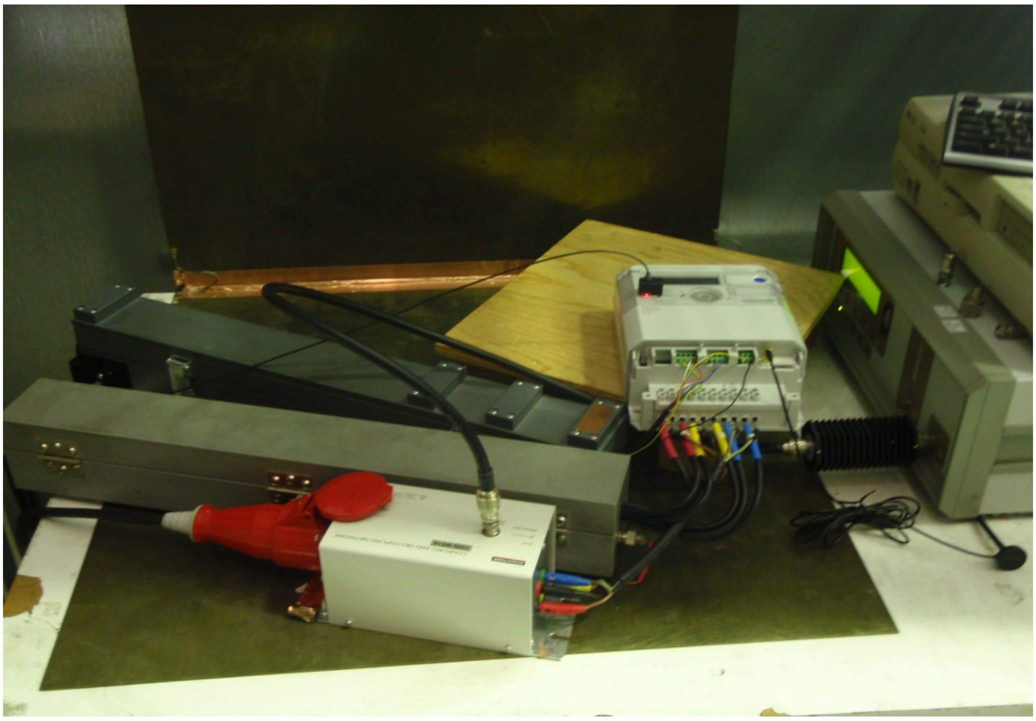
Results: During the tests the following was observed:

- the maximum measured influence due to the RF-field was negligible.

The uncertainty of the measurements was 0,4%.

Remark: During the test the following auxilliary circuits were connected:
- M-BUS, Relay, Pulse output, S0 pulse input, Tariff input

Photograph of the conducted disturbances test:



Test: Surge immunity test

The meter is tested with surges, with the following characteristics:

- cable length	:	1 m
- test mode	:	differential
- phase angle	:	at 60° and 240° relative to zero crossing
- test voltage main circuits	:	4 kV
- test voltage aux. circuits	:	1 kV
- number of tests	:	5 positive and 5 negative
- reptition rate	:	1 / min

meter in operating condition:
- voltage and auxiliary circuits are energized with reference voltage;
- without any current in the current circuits and the current terminals are open circuit.

The test is performed with sample nr. 3.1.

Results: During the tests the following was observed:

Change in register during the test	:	0,00	kWh / kvarh
Pulse produced by the test output	:	0	impulses
Change of information after the test	:	no	

Photograph of the surge test:

Test: Damped oscillatory waves immunity test

The test is carried out according to IEC 61000-4-12, under the following conditions:

- test voltage common mode [kV]	:	2,5
- test voltage diff. mode [kV]	:	1
- 100 kHz, repetition rate [Hz]	:	40
- 1 MHz, repetition rate [Hz]	:	400
- test duration [s]	:	60 (15 cycles with 2s on, 2s off)

meter in operating condition:
- voltage and auxiliary circuits are energized with reference voltage;
- with nominal current

The test is performed with sample nr. 3.1.

Results:

Error before the test [%]	:	+ 0,00
Error during the test [%]	:	+ 0,00
Difference [%]	:	+ 0,00
During the test the meter is perturbed	:	no
The variation of the error is within the limits of the relevant standard	:	yes

Photograph of the damped oscillatory waves immunity test:

Test: Radio interference suppression

The emission of the meter is tested according to CISPR 22, for class B equipment.

The following tests are performed:
a) the radiated emission is measured at an AR in the following frequency range: 30 - 1000 MHz;
b) the emission on the AC mains is measured in the following frequency range: 0,15 - 30 MHz.

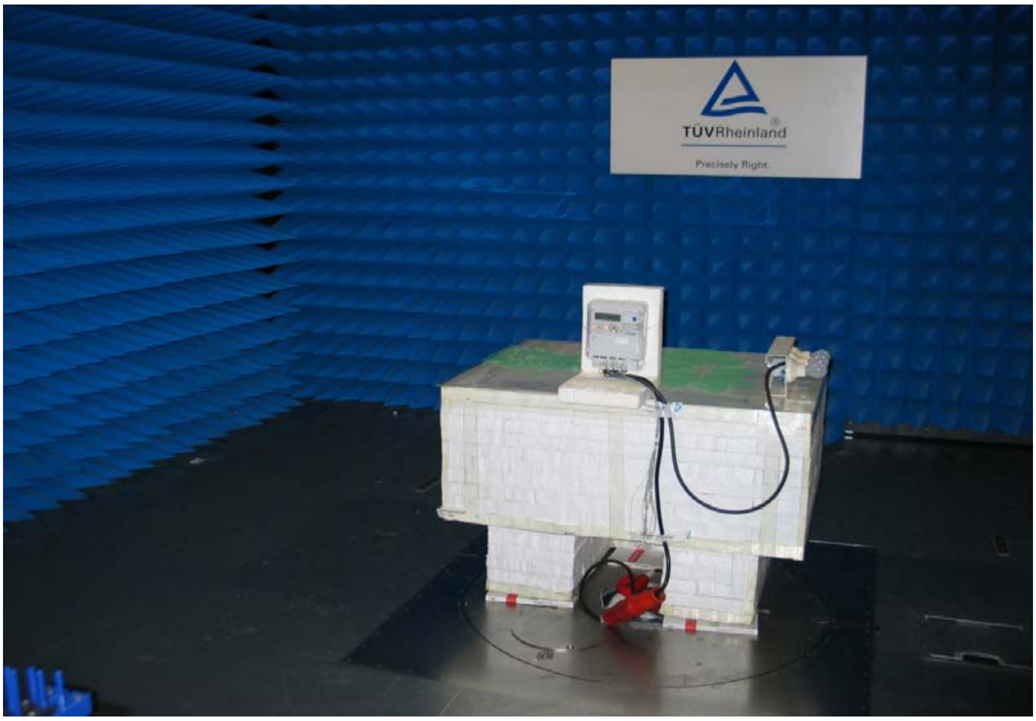
The tests are performed with sample nr. 3.9.

At each test the emission is measured under the following conditions of the watthourmeter:
- with reference voltage;
- current is 10% of the nominal current.

Results: During the tests the following was observed:
a) the maximum measured radiated emission was 29,1 dB(μV)/m at 77,32 MHz.
b) the maximum measured emission on the AC mains was 40,1 dB(μV) at 0,15 MHz.

Remark: The cables have been manipulated in such a way that maximum disturbance levels have been recorded.

Photograph of the radio interference test:

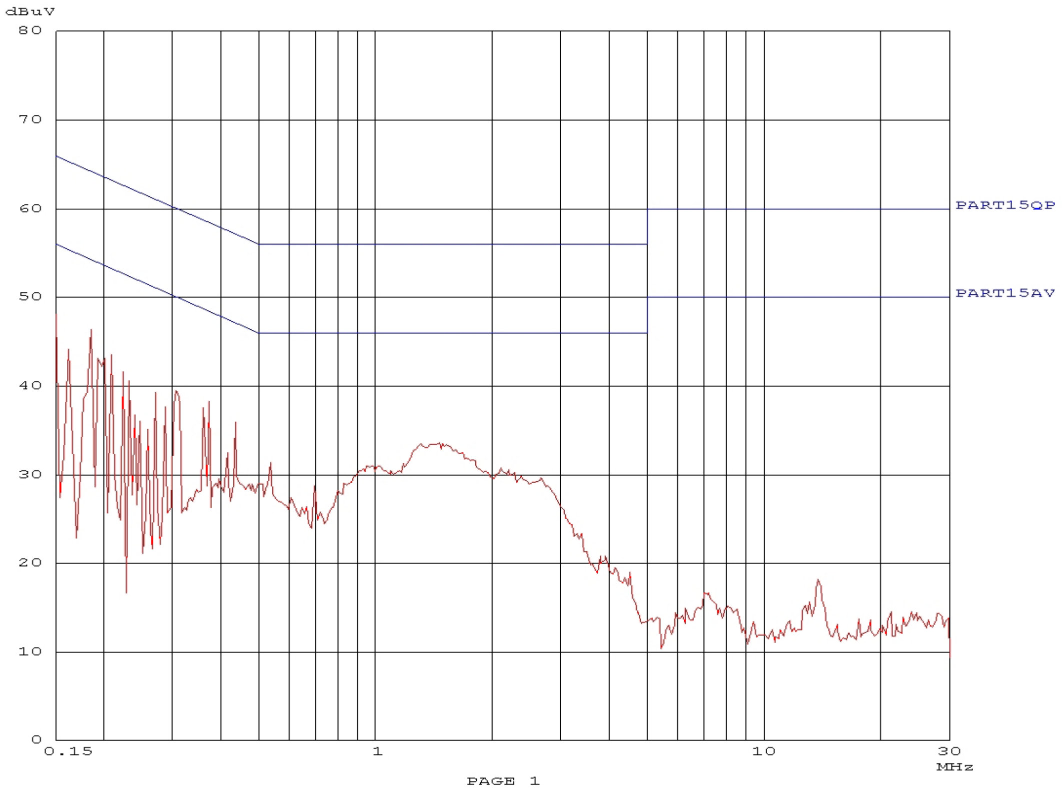


Plot of the conducted emission test:

28. Aug 15 11:05

```
Overview Scan Settings (1 Range)
|--------- Frequencies ------------||--------- Receiver Settings ---------|
   Start          Stop          Step      IF BW   Detector   M-Time    Atten  Preamp
 150k          30M          3.9k        9k       PK       0.10ms    OdBLN    OFF

Final Measurement:  x QP
                    Meas Time:     1 s
                    Subranges:    25
                    Acc Margin:    6dB
```



Test: Accuracy tests at reference conditions

The error of the meters is measured under reference conditions at different values of the current and power factor, while using the test points as indicated in table 13 of the EN 50470-3 document.

Results:

Current	Power factor	Error [%]	
		Sample nr. 3	Sample nr. 4
Imin	1	0,0	0,0
Itr	1	0,0	0,0
	0,5 ind.	0,2	0,2
	0,8 cap.	-0,1	0,0
Itr phase R	1	0,0	0,0
	0,5 ind.	0,2	0,2
Itr phase S	1	0,0	0,0
	0,5 ind.	0,2	0,2
Itr phase T	1	0,0	0,0
	0,5 ind.	0,2	0,1
20 Itr	1	0,0	0,0
	0,5 ind.	0,1	0,1
	0,8 cap.	-0,1	0,0
20 Itr phase R	1	0,0	0,0
	0,5 ind.	0,0	0,1
20 Itr phase S	1	0,0	0,0
	0,5 ind.	0,0	0,0
20 Itr phase T	1	0,0	0,0
	0,5 ind.	0,1	0,1
Imax	1	0,0	0,0
	0,5 ind.	0,0	0,0
	0,8 cap.	-0,1	0,0
Imax phase R	1	0,0	0,0
	0,5 ind.	0,0	0,0
Imax phase S	1	0,0	0,0
	0,5 ind.	0,0	0,0
Imax phase T	1	0,0	0,0
	0,5 ind.	0,0	0,0

Remark: Before the measurements were started, the voltage was connected for at least one hour and a current of I_{tr} was running through the meters.

Test: Repeatability

The accuracy measurements at reference conditions are performed 3 times in order to determine the repeatability, while using the test points as indicated in table 13 of the EN 50470-3 document.

Results:

Current	Power factor	Measure time [s]	Sample nr. 3				
			Error 1 [%]	Error 2 [%]	Error 3 [%]	Average error [%]	Repeatability [%]
Imin	1	240	+ 0,02	+ 0,02	+ 0,02	+ 0,02	+ 0,00
Itr	1	180	+ 0,02	+ 0,02	+ 0,02	+ 0,02	+ 0,00
	0,5 ind.		+ 0,21	+ 0,21	+ 0,21	+ 0,21	+ 0,00
	0,8 cap.		− 0,06	− 0,06	− 0,06	− 0,06	+ 0,00
Itr phase R	1	180	+ 0,04	+ 0,04	+ 0,04	+ 0,04	+ 0,00
	0,5 ind.		+ 0,20	+ 0,20	+ 0,20	+ 0,20	+ 0,00
Itr phase S	1		+ 0,00	+ 0,00	+ 0,00	+ 0,00	+ 0,00
	0,5 ind.		+ 0,20	+ 0,20	+ 0,19	+ 0,20	+ 0,01
Itr phase T	1		+ 0,00	+ 0,00	+ 0,00	+ 0,00	+ 0,00
	0,5 ind.		+ 0,22	+ 0,22	+ 0,23	+ 0,22	+ 0,01
20 Itr	1	60	− 0,01	− 0,01	− 0,02	− 0,01	+ 0,01
	0,5 ind.		+ 0,05	+ 0,05	+ 0,05	+ 0,05	+ 0,00
	0,8 cap.		− 0,05	− 0,05	− 0,05	− 0,05	+ 0,00
20 Itr phase R	1	60	+ 0,00	+ 0,00	+ 0,00	+ 0,00	+ 0,00
	0,5 ind.		+ 0,02	+ 0,02	+ 0,02	+ 0,02	+ 0,00
20 Itr phase S	1		− 0,02	− 0,02	− 0,02	− 0,02	+ 0,00
	0,5 ind.		+ 0,05	+ 0,04	+ 0,05	+ 0,05	+ 0,01
20 Itr phase T	1		− 0,02	− 0,02	− 0,02	− 0,02	+ 0,00
	0,5 ind.		+ 0,08	+ 0,08	+ 0,09	+ 0,08	+ 0,01
Imax	1	30	− 0,03	− 0,03	− 0,03	− 0,03	+ 0,00
	0,5 ind.		+ 0,01	+ 0,00	+ 0,00	+ 0,00	+ 0,01
	0,8 cap.		− 0,05	− 0,05	− 0,06	− 0,05	+ 0,01
Imax phase R	1	30	− 0,01	− 0,01	− 0,01	− 0,01	+ 0,00
	0,5 ind.		− 0,03	− 0,02	− 0,02	− 0,02	+ 0,01
Imax phase S	1		− 0,04	− 0,04	− 0,04	− 0,04	+ 0,00
	0,5 ind.		+ 0,01	+ 0,00	+ 0,01	+ 0,01	+ 0,01
Imax phase T	1		− 0,04	− 0,04	− 0,04	− 0,04	+ 0,00
	0,5 ind.		+ 0,03	+ 0,03	+ 0,04	+ 0,03	+ 0,01

Current	Power factor	Measure time [s]	Sample nr. 4				
			Error 1 [%]	Error 2 [%]	Error 3 [%]	Average error [%]	Repeatability [%]
Imin	1	240	+ 0,01	+ 0,01	+ 0,01	+ 0,01	+ 0,00
Itr	1	180	+ 0,01	+ 0,01	+ 0,01	+ 0,01	+ 0,00
	0,5 ind.		+ 0,15	+ 0,15	+ 0,15	+ 0,15	+ 0,00
	0,8 cap.		− 0,04	− 0,04	− 0,03	− 0,04	+ 0,01
Itr phase R	1	180	+ 0,03	+ 0,03	+ 0,03	+ 0,03	+ 0,00
	0,5 ind.		+ 0,15	+ 0,15	+ 0,16	+ 0,15	+ 0,01
Itr phase S	1		+ 0,00	+ 0,00	+ 0,01	+ 0,00	+ 0,01
	0,5 ind.		+ 0,17	+ 0,17	+ 0,18	+ 0,17	+ 0,01
Itr phase T	1		+ 0,00	+ 0,00	+ 0,00	+ 0,00	+ 0,00
	0,5 ind.		+ 0,13	+ 0,13	+ 0,13	+ 0,13	+ 0,00
20 Itr	1	60	+ 0,00	+ 0,00	+ 0,00	+ 0,00	+ 0,00
	0,5 ind.		+ 0,05	+ 0,05	+ 0,05	+ 0,05	+ 0,00
	0,8 cap.		− 0,02	− 0,02	− 0,01	− 0,02	+ 0,01
20 Itr phase R	1	60	+ 0,01	+ 0,01	+ 0,01	+ 0,01	+ 0,00
	0,5 ind.		+ 0,05	+ 0,05	+ 0,05	+ 0,05	+ 0,00
20 Itr phase S	1		− 0,01	− 0,01	− 0,01	− 0,01	+ 0,00
	0,5 ind.		+ 0,03	+ 0,03	+ 0,03	+ 0,03	+ 0,00
20 Itr phase T	1		+ 0,00	+ 0,00	+ 0,00	+ 0,00	+ 0,00
	0,5 ind.		+ 0,06	+ 0,06	+ 0,06	+ 0,06	+ 0,00
Imax	1	30	− 0,01	− 0,01	− 0,01	− 0,01	+ 0,00
	0,5 ind.		+ 0,01	+ 0,01	+ 0,01	+ 0,01	+ 0,00
	0,8 cap.		− 0,02	− 0,02	− 0,02	− 0,02	+ 0,00
Imax phase R	1	30	+ 0,00	+ 0,00	+ 0,00	+ 0,00	+ 0,00
	0,5 ind.		+ 0,02	+ 0,02	+ 0,02	+ 0,02	+ 0,00
Imax phase S	1		− 0,02	− 0,02	− 0,02	− 0,02	+ 0,00
	0,5 ind.		− 0,01	+ 0,00	− 0,01	− 0,01	+ 0,01
Imax phase T	1		+ 0,00	+ 0,00	+ 0,00	+ 0,00	+ 0,00
	0,5 ind.		+ 0,03	+ 0,04	+ 0,02	+ 0,03	+ 0,02

Test: Variation of the error due to variation of the voltage

The variation of the error is measured due to variation of the voltage at different currents and at different values of the power factor, while using the test points as indicated in table 13 of the EN 50470-3 document.

Results:

Current	Power factor	Sample nr. 3	
		Shift 1,1 U_{ref} [%]	Shift 0,9 U_{ref} [%]
Imin	1	+ 0,0	− 0,0
Itr	1 0,5 ind. 0,8 cap.	+ 0,0 + 0,0 + 0,0	− 0,0 − 0,0 − 0,0
Itr phase R	1 0,5 ind.	+ 0,0 + 0,0	− 0,0 − 0,0
Itr phase S	1 0,5 ind.	+ 0,0 + 0,0	− 0,0 − 0,1
Itr phase T	1 0,5 ind.	+ 0,0 + 0,0	− 0,0 − 0,0
20 Itr	1 0,5 ind. 0,8 cap.	+ 0,0 + 0,0 + 0,0	− 0,1 − 0,0 − 0,1
20 Itr phase R	1 0,5 ind.	+ 0,0 + 0,0	− 0,1 − 0,0
20 Itr phase S	1 0,5 ind.	+ 0,0 + 0,0	− 0,0 − 0,1
20 Itr phase T	1 0,5 ind.	+ 0,0 + 0,0	− 0,0 − 0,0
Imax	1 0,5 ind. 0,8 cap.	+ 0,0 + 0,0 + 0,0	− 0,1 − 0,0 − 0,0
Imax phase R	1 0,5 ind.	+ 0,0 + 0,0	− 0,0 − 0,0
Imax phase S	1 0,5 ind.	+ 0,0 + 0,0	− 0,1 − 0,0
Imax phase T	1 0,5 ind.	+ 0,1 + 0,1	− 0,0 − 0,0

Current	Power factor	Sample nr. 4	
		Shift 1,1 U_{ref} [%]	Shift 0,9 U_{ref} [%]
Imin	1	+ 0,0	− 0,0
Itr	1 0,5 ind. 0,8 cap.	+ 0,0 + 0,0 + 0,0	− 0,0 − 0,0 − 0,0
Itr phase R	1 0,5 ind.	+ 0,0 + 0,0	− 0,0 − 0,0
Itr phase S	1 0,5 ind.	+ 0,0 + 0,0	− 0,0 − 0,0
Itr phase T	1 0,5 ind.	+ 0,0 + 0,0	− 0,0 − 0,0
20 Itr	1 0,5 ind. 0,8 cap.	+ 0,0 + 0,0 + 0,0	− 0,0 − 0,0 − 0,0
20 Itr phase R	1 0,5 ind.	+ 0,0 + 0,0	− 0,0 − 0,0
20 Itr phase S	1 0,5 ind.	+ 0,0 + 0,1	− 0,1 − 0,0
20 Itr phase T	1 0,5 ind.	+ 0,0 + 0,0	− 0,0 − 0,0
Imax	1 0,5 ind. 0,8 cap.	+ 0,0 + 0,0 + 0,0	− 0,1 − 0,0 − 0,0
Imax phase R	1 0,5 ind.	+ 0,0 + 0,0	− 0,0 − 0,0
Imax phase S	1 0,5 ind.	+ 0,0 + 0,0	− 0,1 − 0,0
Imax phase T	1 0,5 ind.	+ 0,0 + 0,0	− 0,0 − 0,0

Test: Variation of the error due to variation of the frequency

The variation of the error is measured at the stated changes of the frequency at different values of the current and the power factor, while using the test points as indicated in table 13 of the EN 50470-3 document.

Results:

Current	Power factor	Sample nr. 3	
		Shift 51 Hz [%]	Shift 49 Hz [%]
Imin	1	+ 0,0	– 0,0
Itr	1	+ 0,0	+ 0,0
	0,5 ind.	+ 0,0	+ 0,0
	0,8 cap.	+ 0,0	– 0,0
Itr phase R	1	+ 0,0	+ 0,0
	0,5 ind.	+ 0,0	– 0,0
Itr phase S	1	+ 0,0	– 0,0
	0,5 ind.	+ 0,0	+ 0,0
Itr phase T	1	+ 0,0	+ 0,0
	0,5 ind.	+ 0,0	+ 0,0
20 Itr	1	+ 0,0	– 0,0
	0,5 ind.	+ 0,0	+ 0,0
	0,8 cap.	+ 0,0	– 0,0
20 Itr phase R	1	+ 0,0	– 0,0
	0,5 ind.	+ 0,0	– 0,0
20 Itr phase S	1	+ 0,0	– 0,0
	0,5 ind.	+ 0,0	– 0,0
20 Itr phase T	1	+ 0,0	– 0,0
	0,5 ind.	+ 0,0	– 0,0
Imax	1	+ 0,0	– 0,0
	0,5 ind.	+ 0,0	+ 0,0
	0,8 cap.	+ 0,0	– 0,0
Imax phase R	1	+ 0,0	– 0,0
	0,5 ind.	+ 0,0	– 0,0
Imax phase S	1	+ 0,0	– 0,0
	0,5 ind.	+ 0,0	– 0,0
Imax phase T	1	+ 0,0	– 0,0
	0,5 ind.	+ 0,0	– 0,0

Current	Power factor	Sample nr. 4	
		Shift 51 Hz [%]	Shift 49 Hz [%]
Imin	1	+ 0,0	+ 0,0
Itr	1	+ 0,0	+ 0,0
	0,5 ind.	+ 0,0	– 0,0
	0,8 cap.	+ 0,0	+ 0,0
Itr phase R	1	+ 0,0	+ 0,0
	0,5 ind.	+ 0,0	– 0,0
Itr phase S	1	+ 0,0	+ 0,0
	0,5 ind.	+ 0,0	+ 0,0
Itr phase T	1	+ 0,0	+ 0,0
	0,5 ind.	– 0,0	– 0,0
20 Itr	1	+ 0,0	+ 0,0
	0,5 ind.	+ 0,0	– 0,0
	0,8 cap.	+ 0,0	+ 0,0
20 Itr phase R	1	+ 0,0	– 0,0
	0,5 ind.	+ 0,0	+ 0,0
20 Itr phase S	1	+ 0,0	– 0,0
	0,5 ind.	+ 0,0	– 0,0
20 Itr phase T	1	+ 0,0	– 0,0
	0,5 ind.	+ 0,0	– 0,0
Imax	1	+ 0,0	– 0,0
	0,5 ind.	+ 0,0	+ 0,0
	0,8 cap.	– 0,0	– 0,0
Imax phase R	1	+ 0,0	– 0,0
	0,5 ind.	+ 0,0	– 0,0
Imax phase S	1	+ 0,0	+ 0,0
	0,5 ind.	+ 0,0	– 0,0
Imax phase T	1	+ 0,0	+ 0,0
	0,5 ind.	+ 0,0	+ 0,0

Test: Variation of the error due to variation of the temperature

The variation of the error is measured due to variation of the temperature at different currents and at different values of the power factor, as indicated in table 13 of the EN 50470-3 document.
At each temperature the shift is calculated in comparison with the measurement at 23°C.

Results:

Current	Power factor	Sample nr. 3						
		Shift -40°C [%]	Shift -25°C [%]	Shift -10°C [%]	Shift +5°C [%]	Shift +40°C [%]	Shift +55°C [%]	Shift +70°C [%]
Imin	1	0,4	0,3	0,2	0,1	-0,1	-0,1	0,0
Itr	1	0,4	0,3	0,2	0,0	-0,1	-0,1	0,0
	0,5 ind.	0,4	0,3	0,2	0,1	-0,1	-0,2	0,0
	0,8 cap.	0,4	0,3	0,2	0,0	-0,1	-0,2	-0,1
Itr phase R	1	0,5	0,4	0,3	0,1	-0,1	-0,2	-0,1
	0,5 ind.	0,5	0,4	0,3	0,1	-0,1	-0,2	-0,1
Itr phase S	1	0,3	0,2	0,2	0,1	-0,1	-0,1	0,0
	0,5 ind.	0,3	0,2	0,2	0,0	-0,1	-0,1	0,0
Itr phase T	1	0,4	0,3	0,2	0,0	-0,1	-0,2	-0,1
	0,5 ind.	0,4	0,3	0,2	0,0	-0,2	-0,2	0,0
20 Itr	1	0,4	0,3	0,2	0,1	-0,1	-0,1	0,0
	0,5 ind.	0,4	0,3	0,2	0,1	-0,1	-0,1	-0,1
	0,8 cap.	0,4	0,3	0,2	0,1	-0,1	-0,1	-0,1
20 Itr phase R	1	0,4	0,4	0,3	0,1	-0,1	-0,1	-0,1
	0,5 ind.	0,5	0,4	0,3	0,1	-0,1	-0,2	-0,1
20 Itr phase S	1	0,3	0,2	0,2	0,1	-0,1	-0,1	0,0
	0,5 ind.	0,3	0,2	0,2	0,1	-0,1	-0,1	0,0
20 Itr phase T	1	0,4	0,3	0,2	0,0	-0,1	-0,2	-0,1
	0,5 ind.	0,4	0,3	0,2	0,0	-0,1	-0,1	-0,1
Imax	1	0,4	0,3	0,2	0,1	-0,1	-0,1	-0,1
	0,5 ind.	0,4	0,3	0,2	0,1	-0,1	-0,1	-0,1
	0,8 cap.	0,4	0,3	0,2	0,1	-0,1	-0,1	-0,1
Imax phase R	1	0,5	0,3	0,3	0,1	-0,1	-0,1	-0,1
	0,5 ind.	0,5	0,4	0,3	0,1	-0,1	-0,1	-0,1
Imax phase S	1	0,3	0,2	0,2	0,1	-0,1	-0,1	0,0
	0,5 ind.	0,3	0,2	0,2	0,1	-0,1	-0,1	0,0
Imax phase T	1	0,4	0,3	0,2	0,0	-0,1	-0,1	-0,1
	0,5 ind.	0,4	0,3	0,2	0,0	-0,1	-0,1	-0,1

Current	Power factor	Sample nr. 4						
		Shift -40°C [%]	Shift -25°C [%]	Shift -10°C [%]	Shift +5°C [%]	Shift +40°C [%]	Shift +55°C [%]	Shift +70°C [%]
Imin	1	0,2	0,1	0,2	0,0	0,0	-0,1	0,0
Itr	1	0,3	0,1	0,2	0,0	-0,1	-0,2	0,0
	0,5 ind.	0,3	0,1	0,2	0,0	-0,1	-0,1	0,1
	0,8 cap.	0,2	0,1	0,2	0,0	-0,1	-0,2	0,0
Itr phase R	1	0,3	0,2	0,2	0,0	-0,1	-0,1	0,0
	0,5 ind.	0,3	0,2	0,2	0,0	0,0	-0,1	0,1
Itr phase S	1	0,3	0,2	0,2	0,0	-0,1	-0,2	0,0
	0,5 ind.	0,3	0,2	0,2	0,0	-0,1	-0,1	0,1
Itr phase T	1	0,2	0,1	0,1	0,0	0,0	-0,2	0,0
	0,5 ind.	0,2	0,1	0,1	-0,1	-0,1	-0,1	0,1
20 Itr	1	0,3	0,1	0,2	0,0	-0,1	-0,1	0,0
	0,5 ind.	0,2	0,1	0,2	0,0	-0,1	-0,1	0,0
	0,8 cap.	0,2	0,2	0,2	0,0	-0,1	-0,2	0,0
20 Itr phase R	1	0,3	0,2	0,2	0,0	-0,1	-0,1	0,0
	0,5 ind.	0,3	0,2	0,2	0,0	0,0	-0,1	0,0
20 Itr phase S	1	0,3	0,2	0,2	0,0	-0,1	-0,1	0,0
	0,5 ind.	0,3	0,2	0,2	0,0	-0,1	-0,1	0,0
20 Itr phase T	1	0,2	0,1	0,1	0,0	-0,1	-0,1	0,0
	0,5 ind.	0,2	0,1	0,1	-0,1	-0,1	-0,1	0,1
Imax	1	0,2	0,1	0,2	0,0	-0,1	-0,1	0,0
	0,5 ind.	0,2	0,1	0,2	0,0	-0,1	-0,1	0,0
	0,8 cap.	0,3	0,2	0,2	0,0	-0,1	-0,1	0,0
Imax phase R	1	0,3	0,2	0,2	0,0	-0,1	-0,1	0,0
	0,5 ind.	0,3	0,2	0,2	0,0	0,0	-0,1	0,0
Imax phase S	1	0,3	0,2	0,2	0,0	-0,1	-0,1	0,0
	0,5 ind.	0,3	0,2	0,2	0,0	-0,1	-0,1	0,0
Imax phase T	1	0,2	0,1	0,1	0,0	-0,1	-0,1	0,0
	0,5 ind.	0,2	0,1	0,1	0,0	-0,1	-0,1	0,1

Test: Maximum permissible error

For each measuring point the composite error is calculated by using the following formula:

$$e_c = \sqrt{e^2(I,\cos\varphi) + \delta e^2(T,I,\cos\varphi) + \delta e^2(U,I,\cos\varphi) + \delta e^2(f,I,\cos\varphi)}$$

with:

- *e* (*I* , cos *j*)	=	the intrinsic error of the meter at a certain load;
- *de* (*T, I* , cos *j*)	=	the additional percentage error due to the variation of the temperature at the same load;
- *de(U, I* , cos *j*)	=	the additional percentage error due to the variation of the voltage at the same load;
- *de(f, I,* cos *j*)	=	the additional percentage error due to the variation of the frequency at the same load.

Results:

Current	Power factor	Sample nr. 3							
		Error -40°C [%]	Error -25°C [%]	Error -10°C [%]	Error +5°C [%]	Error +23°C [%]	Error +40°C [%]	Error +55°C [%]	Error +70°C [%]
Imin	1	0,4	0,3	0,2	0,1	0,0	0,1	0,1	0,1
Itr	1	0,4	0,3	0,2	0,1	0,0	0,1	0,1	0,1
	0,5 ind.	0,5	0,4	0,3	0,2	0,2	0,3	0,3	0,2
	0,8 cap.	0,4	0,3	0,2	0,1	0,1	0,1	0,2	0,1
Itr phase R	1	0,5	0,4	0,3	0,1	0,1	0,1	0,2	0,1
	0,5 ind.	0,6	0,4	0,4	0,2	0,2	0,2	0,3	0,2
Itr phase S	1	0,3	0,2	0,2	0,1	0,0	0,1	0,1	0,0
	0,5 ind.	0,4	0,3	0,3	0,2	0,2	0,2	0,2	0,2
Itr phase T	1	0,4	0,3	0,2	0,0	0,0	0,1	0,2	0,1
	0,5 ind.	0,4	0,4	0,3	0,2	0,2	0,3	0,3	0,2
20 Itr	1	0,4	0,3	0,2	0,1	0,1	0,1	0,1	0,1
	0,5 ind.	0,4	0,3	0,2	0,1	0,1	0,1	0,1	0,1
	0,8 cap.	0,4	0,3	0,2	0,1	0,1	0,1	0,1	0,1
20 Itr phase R	1	0,4	0,4	0,3	0,1	0,1	0,1	0,1	0,1
	0,5 ind.	0,5	0,4	0,3	0,1	0,0	0,1	0,2	0,1
20 Itr phase S	1	0,3	0,2	0,2	0,1	0,1	0,1	0,1	0,1
	0,5 ind.	0,3	0,2	0,2	0,1	0,1	0,1	0,1	0,1
20 Itr phase T	1	0,4	0,3	0,2	0,1	0,0	0,1	0,2	0,1
	0,5 ind.	0,4	0,3	0,2	0,1	0,1	0,2	0,2	0,1
Imax	1	0,4	0,3	0,2	0,1	0,1	0,1	0,1	0,1
	0,5 ind.	0,4	0,3	0,2	0,1	0,0	0,1	0,1	0,1
	0,8 cap.	0,4	0,3	0,2	0,1	0,1	0,1	0,1	0,1
Imax phase R	1	0,5	0,3	0,3	0,1	0,0	0,1	0,1	0,1
	0,5 ind.	0,5	0,4	0,3	0,1	0,1	0,1	0,2	0,1
Imax phase S	1	0,3	0,3	0,2	0,1	0,1	0,1	0,1	0,1
	0,5 ind.	0,3	0,2	0,2	0,1	0,1	0,1	0,1	0,1
Imax phase T	1	0,4	0,3	0,2	0,1	0,1	0,1	0,2	0,1
	0,5 ind.	0,4	0,3	0,2	0,1	0,1	0,1	0,1	0,1

Current	Power factor	Sample nr. 4							
		Error -40°C [%]	Error -25°C [%]	Error -10°C [%]	Error +5°C [%]	Error +23°C [%]	Error +40°C [%]	Error +55°C [%]	Error +70°C [%]
Imin	1	0,2	0,1	0,2	0,0	0,0	0,1	0,2	0,0
Itr	1	0,3	0,1	0,2	0,1	0,1	0,1	0,2	0,1
	0,5 ind.	0,3	0,2	0,2	0,2	0,2	0,2	0,2	0,2
	0,8 cap.	0,2	0,1	0,2	0,1	0,1	0,1	0,2	0,1
Itr phase R	1	0,3	0,2	0,2	0,1	0,1	0,1	0,1	0,1
	0,5 ind.	0,3	0,2	0,3	0,2	0,2	0,2	0,2	0,2
Itr phase S	1	0,3	0,2	0,2	0,0	0,0	0,1	0,2	0,0
	0,5 ind.	0,3	0,2	0,3	0,2	0,2	0,2	0,2	0,2
Itr phase T	1	0,2	0,1	0,1	0,1	0,0	0,1	0,2	0,1
	0,5 ind.	0,2	0,2	0,2	0,2	0,1	0,1	0,2	0,2
20 Itr	1	0,3	0,1	0,2	0,0	0,0	0,1	0,1	0,0
	0,5 ind.	0,3	0,1	0,2	0,1	0,1	0,1	0,1	0,1
	0,8 cap.	0,2	0,2	0,2	0,1	0,1	0,1	0,2	0,1
20 Itr phase R	1	0,3	0,2	0,2	0,1	0,1	0,1	0,1	0,1
	0,5 ind.	0,3	0,2	0,2	0,1	0,1	0,1	0,1	0,1
20 Itr phase S	1	0,3	0,2	0,2	0,1	0,1	0,1	0,1	0,1
	0,5 ind.	0,3	0,2	0,2	0,1	0,1	0,1	0,1	0,1
20 Itr phase T	1	0,2	0,1	0,1	0,1	0,0	0,1	0,1	0,0
	0,5 ind.	0,2	0,1	0,2	0,1	0,1	0,1	0,1	0,1
Imax	1	0,2	0,1	0,2	0,1	0,1	0,1	0,1	0,1
	0,5 ind.	0,2	0,1	0,2	0,1	0,1	0,1	0,1	0,1
	0,8 cap.	0,3	0,2	0,2	0,0	0,0	0,1	0,1	0,1
Imax phase R	1	0,3	0,2	0,2	0,1	0,0	0,1	0,1	0,1
	0,5 ind.	0,3	0,2	0,2	0,1	0,0	0,1	0,1	0,1
Imax phase S	1	0,3	0,2	0,2	0,1	0,1	0,1	0,1	0,1
	0,5 ind.	0,3	0,2	0,2	0,0	0,0	0,1	0,1	0,0
Imax phase T	1	0,2	0,1	0,1	0,1	0,0	0,1	0,1	0,0
	0,5 ind.	0,2	0,1	0,1	0,1	0,1	0,1	0,1	0,1

Test: Disturbance with 2-150 kHz harmonics

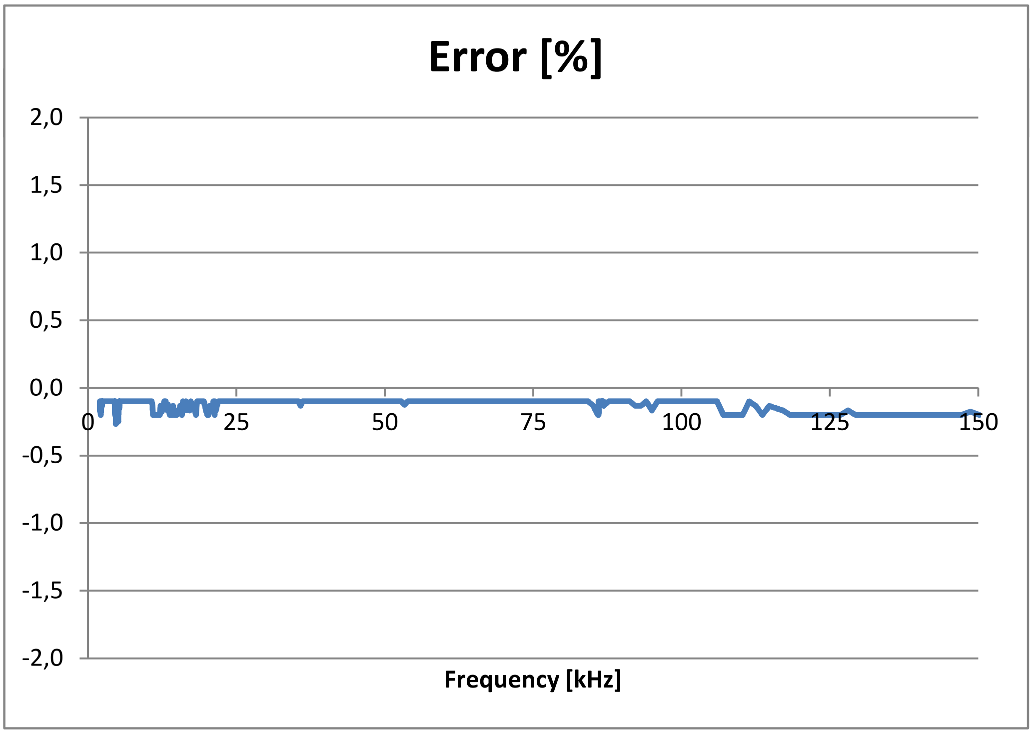
The meter is exposed to disturbances in the current at frequencies in the range 2 - 150 kHz, in conformity with CLC/TR 50579.

The measurements are performed under the following conditions:
- with reference voltage;
- with nominal current.

The disturbances are applied with the following characteristics:
- 2-30 kHz, 2% Imax
- 30-150 kHz, 1% Imax
- frequency step 1%
- dwell time 10s minimally

The tests are performed with sample nr. 3.1.

Results: During the tests the maximum observed deviation was: ±0,3%.



Photograph: